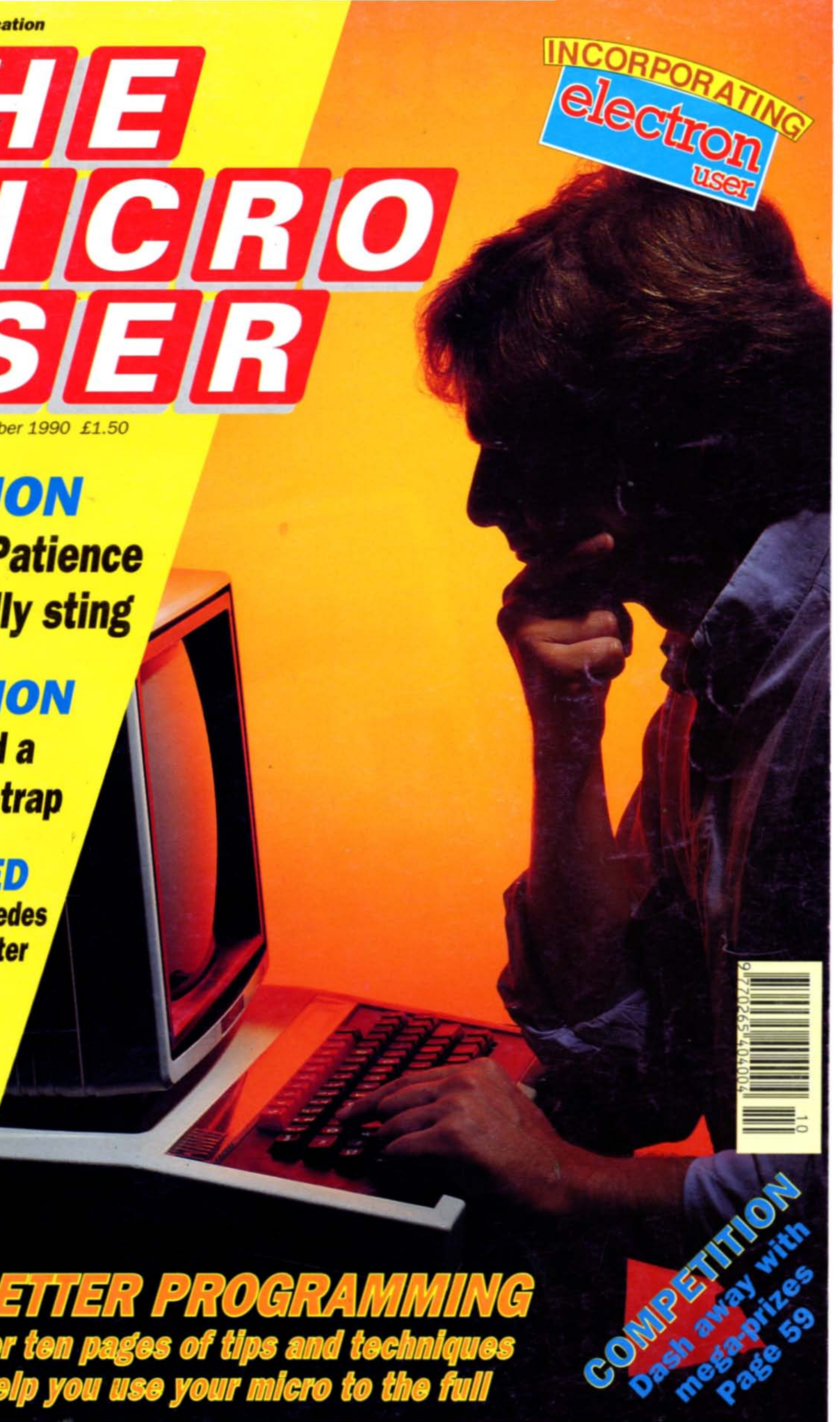
A Database Publication

THE MICRO USER

INCORPORATING electron user

Volume 8 Number 8 October 1990 £1.50



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SmallTalk-80
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Slideshow
Jiglet
Help
...and all the latest games

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Over ten pages of tips and techniques to help you use your micro to the full

COMPETITION
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Page 59

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- **The Micro User:** Mike Cook will be available to help and advise on BBC/Master related matters.
- **Gordon Taylor:** The renown Archi 'Guru' and technical writer will be available to advise on Archimedes related matters.
- **Acorn Computer's** representitives will talk about proposed new products and answer all yours questions.

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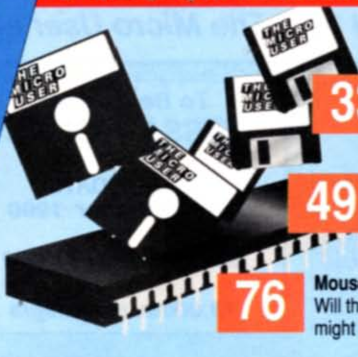
PROGRAMMING SPECIAL



33 **Purely Academic**
Is GOTO the worst instruction in Basic or a boon in tight situations? We investigate.

49 **SmallTalk-80**
OOP is the latest idea in programming. Ffind out what it is and what the fuss is about.

76 **Mousetrap** *
Will the world beat a path to your door? It might if you know how to use recursion.

99 **Sideways Ram Builder** *
Don't know how to make your programs run in sideways ram? Now you don't need to.

109 **Random Access Filing** *
Discover how you can write your own dedicated database system

THE END OF THE WORLD IS NIGH

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue. *Get it right* ✓

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 126 to find just what you're looking for – from cheap modems to complete computer systems.

Newcomers

51 **!LogicWorks**
Forget the soldering iron. Now you can test logic circuits without leaving your micro's keyboard.

81 **!Slideshow**
Graphic presentations on your 32 bit micro. We report our findings on this new software package.

Education

19 **Update**
Up-to-the-minute news of the Acorn range of micros in use in the world of education.

22 **Education Reviews**
We look at the latest software for the BBC Micro series in schools including:

- !Help
- Kaleidoscope
- Stig of the Dump

REGULARS: News 7 • PD Page 31 • Problem Solved 41

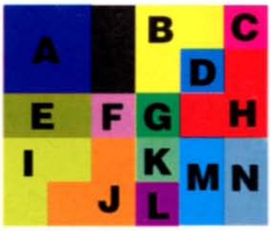
Specials

55 **Scorpion**
Do you have the skill to play this deadly patience card game through to the end? *

37 **Routine Matters**
A new selection of fascinating utilities that you can include in your programs. *

73 *

Tidbits
You'll need plenty of patience to solve this complex block puzzle from the 30's



66 **Our reviewers delve deep into the depths of the latest games releases.**

SOFTWARE SCENE

Herewith The Clues

Hostages

St Andrews
1:par 4
Superior Golf

INERTIA
by D.Postlethwaite
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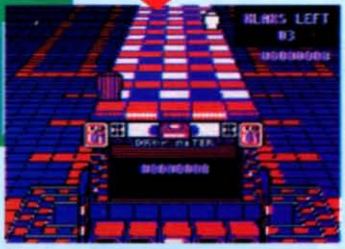
Inertia



Klax

INDEX to products featured in this month's issue

Adventure ...44
Castle Dracula ...45
Citadel ...46
Corruption ...45
Dodgy Geezers ...44
Dune Rider ...46
Dungeon Adventure ...44
Elite ...45
Factory ...19
Five Spheres of Goliath 44
Folio ...20
Fortress ...46
Geography for the 1990s ...19
Giantkiller ...45
!Help ...25
Henrietta's book of spells ...19
Herewith the clues ...67
Hostages ...71
Inertia ...68
Jigsaw ...23
Jiglet ...23
Kaleidoscope ...24
Labyrinth ...47
LogicWorks ...51
Logo ...83
Mathematics in China ...19
Music 5000 Universal ...19
Myth of Moby ...45
Ollie the Octopus ...19
Oxbridge ...44
Palace of Magic ...46
Play it again Sam 3 ...46
Psycastria ...46
Rock ...20
Rombox ...41
Slideshow ...81
SmallTalk-80 ...49
Space Hi-way ...46
Spell-Master ...41
Sphere of Destiny 2 ...46
Stig of the Dump ...22
Superior Golf ...66
Time Traveller ...20
Tiny Draw ...20
Tiny Logo ...20
Touchtec 501 ...20

Mad Hatter 44 • Hac Man 46 • Body Building 61 • Letters 117

FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- Scorpion Patience
- Random Access Filing
- Tidbit Teaser
- Routine Matters

In addition, those readers with a BBC A3000 or Archimedes series machine will also get:

- !SparkPlug
- !Hyper
- Music
- Hot Rocks

THE MICRO USER
THE MICRO USER

For new subscribers there's a special gift: A free binder to keep your copies of The Micro User.

Find out how to subscribe on Page 125.

Key to which micro articles are suitable for

- Electron
- BBC B
- BBC B+
- Master 128
- Master Compact
- Archimedes series and BBC A3000

THE MICRO USER

Into Business

In our special business issue NEXT MONTH we cover laser printers and the software you need to get your company running. Not forgetting our regular features, plus the money-saving PD section.

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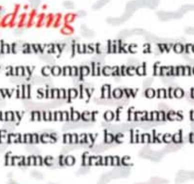

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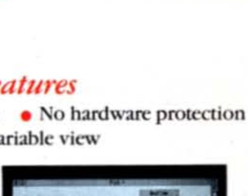
The Instinctive DTP

Ovation is supplied with a tutorial and complete user guide, although you probably won't need to refer to it very often. Ovation makes full use of the RISC OS multi-tasking environment to provide a formidable array of features that are easy to learn and instinctive to use. A quick reference card is also included, which lists all the keyboard and mouse short cuts.

Other Features

- Multi-tasking/multi-documents
- No hardware protection
- Full WYSIWYG display with variable view
- Fast built-in spelling checker (requires 2Mb)
- Printer drivers for Epson, PostScript, LaserJet, and Integrex printers
- Import Draw and Sprite files. Features include scale, crop, fit-to-frame
- Master pages for each chapter
- Cut/copy/paste using clipboard
- Multiple columns
- Find and replace
- Automatic headers and footers
- Supplied with 4 outline fonts (13 faces)
- Variable (& fractional) font sizes 1pt to 500pt
- Supports coloured text, frames and borders
- Stylesheets and customised start-up
- Definable frame borders
- Linkable text frames
- Supplied with full range of clipart
- Variable size, style and colour lines
- Manual and auto hyphenation (requires 2Mb)

And much, much more......



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News BEAT

Acorn launch two new models

ACORN have just released two new products. Aimed at professional users, the A540 is now the top of the Archimedes range

And, for people who want the benefits of the Learning Curve with a higher specification computer than the BBC A3000, there's now an Archimedes Learning Curve.

The A540, which costs £2,995+VAT, is claimed to be the most powerful machine at the price.

It maximises the potential of the Risc OS multi-tasking environment and, with its processing capability and memory, is ideal for running several applications at once and transferring data between them.

In appearance much like the rest of the Archimedes range, it has three free expansion slots. At its heart is an Arm 3 chip running at 25MHz – about four times faster than Arm 2. A 4k cache memory gives further performance gains by reducing the number of times main memory has to be accessed.

The A540 comes with 4Mb of ram as standard but is upgradable to 16Mb using plug-in modules.

It has the usual 3.5in floppy disc drive and a built-in SCSI 100Mb hard disc. All of the standard Risc OS applications – like !Draw, !Edit and !Paint – are installed on the hard disc.

The SCSI interface also allows you to connect up to six external devices like CD roms and tape streamers.

Several other industry standards are built into the machine, meaning it can easily be connected to a Unix environment or networked using Econet or Ethernet.

The A540 video circuitry can support a wide range of monitors including multiscan, VGA, SuperVGA and very high resolution monochrome models.

The new computer's power means that MSdos applications can be run under emulation at a similar speed to an AT class IBM PC compatible.

But with suitable software the machine will easily out–perform most micros of any make including a 25 MHz 486 PC.

Its vast processing power makes it ideal for applications like image processing.

The Archimedes Learning Curve, launched to build on the success of the BBC A3000 version, features the A420/1, which has 2Mb of ram and a 20 Mb hard disc – an ideal introduction to the world of professional computing.

It comes with the same software as the A3000 version – Genesis, 1st Word Plus and PC emulator – plus the Acorn DTP package. There are two new Genesis applications, and all the software is on the hard disc.

The Archimedes Learning Curve costs £1,299 plus VAT (excluding the monitor), which is £200 less than the former price of the A420 alone.

● An exciting new initiative is about to be launched by Acorn. Full details next month.

Enhanced Protext for Archimedes

ONE of the fastest word processors has now been teamed up with one of the fastest micros.

To bring Archimedes owners the benefits of a business-standard wordprocessor, Arnor (0733 68909) have produced an Archimedes version of its popular Protext package. It goes on the market this month.

The company have also promised an increasing commitment to Archimedes machines in coming months.

Protext Version 5.0 includes a whole host of improvements on its predecessor, Version 4.2 including a new and enhanced pull-down menu system with between 60 and 70 per cent of the functions now available from menu as well as keyboard.

Arnor have put in a lot of work on the printing section of the program, which now supports multiple fonts.

The number of files which can be opened has been increased from 2 to 36, with the addition of split screen editing.

Other features include index and contents generation, footnotes, newspaper column printing, automatic timed save, programmable mailmerge language, add column or row of figures, and macros.

Languages supported by Version 5.0 include Albanian, Basque, Czech, Danish, Dutch, Esperanto, Estonian, Flemish, French, German, Hungarian, Irish, Italian, Latin, Lithuanian, Norwegian, Polish, Portuguese, Rumanian, Serbocroatian, Slovak, Spanish, Slovene, Swedish and Welsh. It will cost £149.95.

"The announcement of Protext heralds the start of Arnor's support for the Archimedes system, and further products are planned for coming months", promised the company's sales manager, Doug Thompson.

"Most of these are under wraps at present but one program which will go across to the Archimedes quite quickly is our PC database Prodata".

A companion to Protext, Prodata uses the same key strokes and many of the same concepts, but can stand alone as a powerful database manager in its own right. It employs a simple set of menus which can be used with keyboard or mouse.

Existing versions cost £79.95.

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Teachers turn out turtles

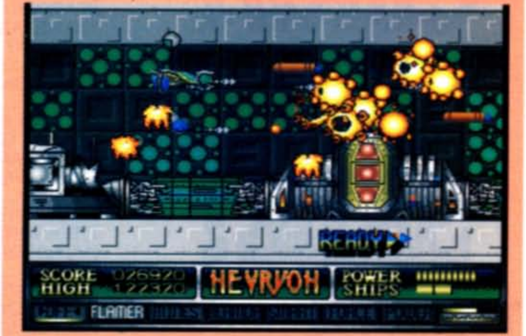
AS the craze for those mutant Ninja amphibians continues, news has come in of another host of record-breaking turtles which are proliferating in Hampshire schools. Their unusual feature is a price of £50. More than 200 of these home-made turtles have been produced by teachers on courses at La Sainte Union College run by the Institute of Southampton.

They feature stepper motors and a Dart driver program similar to that used by Logotron. Their software also includes special scaling features to compensate for friction on different floor surfaces.

"Teachers built the equipment on the first day of the course and spent the next day learning how to use it", said a course spokesman. "This cut out a day's labour charge, which is one of the main items keeping up the price of other turtles.

"The cost of the parts would now be around £60, but even that is cheap for a turtle. We called our turtles Tracker, and they are still giving good service in Hampshire's schools, where pupils have turned them into anything which takes their fancy".

Dropping in on the Arc



Nevryon

FOLLOWING on the heels of Nevryon for the 8 bit BBC Micro the 4th Dimension (0742 700661) have now released the 32 bit version. Packed with marauding aliens you fly through the eight horizontally scrolling levels to destroy the huge alien at the end. It's available now for just £19.95.

With more than 20 levels of smooth arcade action, Drop Ship is one of two further offerings .

It puts players in charge of a ship plotted to an accuracy of 0.0001 of a pixel and the aim is to collect credits for extra weaponry, anti-gravity controllers and much more.

Moving at 50 frames a second , Drop Ship is packed with a wide variety of features and comes on two discs with complete instruction manual. It will shortly be available for Archimedes machines only at a price of £19.95.

Also due this month is Break 147, a full 3D snooker implementation with solid graphics and digitised sound effects.

Swerve and stun backspin are just two of the realistic shots and you can view the table from any angle even as balls are moving.

Following normal snooker rules, Break 147 allows Archimedes users to play matches, set up trick shots or just practise with play against human opponents or the computer.

Price, £24.95.

Hackers' holiday ends

THE Computer Misuse Act is now law, bringing into force three new criminal offences.

Michael Colvin, the Conservative MP for Romsey whose successful Private Member's Bill brought about the new Act has added his own stern warnings to the computer world.

"The Act can only complement and not replace security procedures", he said. "Users will have to examine their existing security procedures and possibly redefine the authority of users of their systems if they are to receive the full support of the law.

"My message to computer users is that Parliament has done its bit – now it is up to you to do yours. It will provide a coherent regime for the prosecution of those who misuse computers.

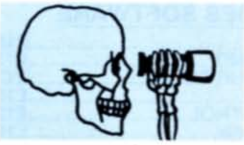
"This legislation has been framed specifically to deal with the new mischiefs that modern technology has brought and the police now have the power to prosecute computer misuse without the need, in some cases, to try and stretch the existing ciminal law.

"The legal position is plain. The Act gives a clear signal to the future generations of would-be hackers that computer misuse is no longer tolerated by society".

The new offences which came into force on August 29 are one of basic unauthorised access with a penalty of up to six months imprisonment and fines of up to £2,000; unauthorised access with the intention of committing a more serious crime and unauthorised modification of computer data, both of which carry up to five years prison with unlimited fines.

Slightly modified from the original Law Commission Report on computer misuse, the Act includes new jurisdiction rules to cover international hacking.

Any offence will be prosecutable if it is conducted from or directed against any system in the UK.



The Micro User goes to war

POTENTIAL army recruits are are being introduced to tanks and guns by a game launched in the first issue of *The Micro User* – seven years ago.

Death Watch is one of the attractions in the army's mobile recruitment unit based in Portsmouth and seen at many events around the south coast.

It has been enlisted into service with a Master 128 thanks to Portsmouth computer consultant Peter Rawson, who specialises in Acorn installations and is a long-time reader of *The Micro User*.

Peter was contacted by his local army recruitment office which wanted a quick-fire game of skill involving tanks or other military features to attract passers-by. He came up with 12 suggestions and was asked to provide demos of six.

"They chose Death Watch because it is based on aiming and firing", he said. "You fire from behind a tank at other tanks, ships and planes. For its time, it is a very good game".

The Acorn on platform...

RAIL travellers are used to the monitor timetable displays in large stations. Now, Master 128 and Archimedes 310 machines are bringing that same facility to passengers using small branch line stations.

Bocking Lane Information Systems of Sheffield have developed a new approach to customer information based around the two Acorn machines. It gives passengers accurate, up-to-date information and frees station staff from constantly answering passenger queries.

The BLISS system feeds standard monitors through existing wiring and has attracted British Rail because it is easy to install, reliable and cheaper than other similar systems.

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Colourful routine

A NEW Risc OS version of ChangeFSI, the software routine which allows high quality, full-colour images to be displayed in any mode on the Archimedes and BBC A3000, has been announced by Wild Vision (091-281 8481).

ChangeFSI converts images derived from sprites, digitisers, frame stores or from other computers.

It will also scale images to any size without sacrificing quality and will convert them from one Archimedes mode to another.

Colour and detail are maintained during manipulation thanks to advanced image processing techniques which are combined with dithering to make the best use of the Arc's 256 colour palette.

Colour anti-aliasing is used when images are scaled down or when converting to modes with fewer colours than the source image.

ChangeFSI was developed by Roger Wilson of Acorn and is distributed under licence by Wild Vision. It costs £25.30.

Cumana cut the cost of memory

THANKS to success in negotiating bulk volume discount prices for the chips, Cumana (0483 503121) have announced what they believe to be the cheapest 1Mb memory upgrade board for the BBC A3000.

If bought through the educational discount scheme, the board costs £74.75 and is built on full automated chip insertion machines which, it is claimed, means consistent quality with no contamination caused by handling or hand soldering.

It is tested on automated equipment and uses eight 80 nanosecond 256K x 4 Dram chips.

"Some other boards are using 100 nanosecond chips, but these may give performance problems", said Cumana managing director Don Bolton.

Interactive video gets a boost

BRITISH Nuclear Forum have collaborated with Newcastle University and Acorn Computers in an attempt to break the "chicken and egg" situation currently facing the future of interactive video.

They have produced three double-sided discs for use with Archimedes and BBC A3000 machines to meet the science and maths needs of the National Curriculum.

"There's still a big barrier", said the director of its Interactive Learning Project, Dr Madeleine Atkins. "Not many schools have disc players, so publishers and video companies have not thought it worth making discs.

"Because there are few discs, schools and local education authorities have not thought it worth buying players.

"BNF have taken a big step by making these three curriculum-based discs. We hope other industries will follow. Another move to break the chicken and egg barrier has been BNF's decision to standardise on the Archimedes". Covering Energy, Risk & Probability and Radiation & Radio-activity, the discs were launched during an interactive science presentation held at The Royal Society in London. Among speakers at the presentation was Chris Humphries, the head of Acorn's Education Business Unit.

"Acorn strongly supports the project, its aims and the packages which have been developed to a high educational quality", he told The Micro User. "We are also making efforts to bring these discs effectively to the market and are currently seeking to do this through one of our distributors".

The three BNF discs are aimed at 12 to 16–year-olds studying for GCSE. They are the joint effort of a team of teachers, educationalists at Newcastle University, film and video experts and computer programmers. The discs' availability and price will be fixed decided.

Mac link upgraded

SUPPORT for Archimedes and Master Compact machines has been included in the latest upgrade to BBC Micro-Macintosh connectivity package View>Mac from Human-Computer Interface (0223 314934).

View>Mac 3 also supports three new document formats – educational word processor Edword, standard Archimedes word processing package 1st Word Plus and integrated Archimedes productivity tool PipeDream.

The program automatically determines the type of computer being used and downloads an appropriate communications program. It has also been improved to give transfers up to twice as fast as the earlier version with the ability to transfer and convert a whole directory of files in a single operation.

Files can be transferred to or from a Macintosh, with each conversion preserving the style and format of the original including bold, underline, text alignment, tab settings, headers, footers and formatting. Data files can also be transferred without conversion.

View>Mac 3 costs £79.35, with a special upgrade price of £44.85. Serial cables for connecting an Archimedes to a Mac will be available for £28.75.

Beef up the BBC A3000

MORLEY Electronics (091-257 6355) have provided a low-cost solution for BBC A3000 owners who want to realise the full potential of their micros. Now available is a new hard disc drive which incorporates an ST506 interface.

Featuring a 28ms drive for maximum speed, it comes in a colour co-ordinated case and includes whisper-quiet fan and switched mode power supply. There are plans to release similar disc drives for Archimedes 305 and 310 machines in the near future.

Morley's drives cost £399 for 20Mb, £499 for 40Mb and £620 for 55Mb. The ST506 interface is available separately at £149. These prices do not include VAT.

Enter son of HyperActive

ALLIED Interactive (091-482 2214) have given birth to a new offspring of their HyperActive family of interactive video products HyperActive Junior.

This interactive video controller for the BBC A3000 needs a minimum ram of 1Mb and is based around the same video technology as its forebears, HyperActive One and Two.

HyperActive Junior provides a simplified range of video effects allowing computer or video to be displayed at full brightness, half-tone or mixed.

On board Eprom gives software compatibility with HyperActive One and Two and allows for control of the videodisc player via the optional RS232 port. Price £327.75.

Arc Eprom programmer

RACING Car Computers (0279 812496) have launched a new Eprom programmer for the Archimedes 400 series and the BBC A3000. Designed specifically for the Risc OS Wimp, the software interface is fully multi–tasking and includes a full feature hex editor.

Device selection is controlled by the software and the package can handle standard, NMOS and CMOS Eproms ranging from 2716 to 27512.

A special custom option allows for any device to be specified in terms of size, programming and supply voltages and speed.

A variety of data formats is supported.

Two Eprom programmers are available, both of which use the same software interface.

The serial unit connects via the RS232 port, has its own internal powwer supply and communicates at 19,200 baud with the Archimedes using its own intelligent on-board microcontroller.

The parallel unit consists of a plug-in expansion card which needs a backplane and a small box which houses the ZIF socket for the Eproms. This connects to the expansion card via a flying lead.

The software interface with a choice of either serial or parallel programmer costs £149.95.

Also offered is a range of adaptor boards which allow popular microcontrollers to be programmed using the same package.

Boards for the SGS Z86E11 and Texas 77C82 area already available and RCC are currently working on adaptors for other devices.

New look at Basic

ELECTRON, BBC Micro and Archimedes owners can now take further steps in learning Basic programming thanks to a range of extra lessons prepared by Universal Computer Support (0922 30038).

UCS are continuing their Elementary Basic Course Part 2 with another 16 in-depth lessons suitable for students of all levels.

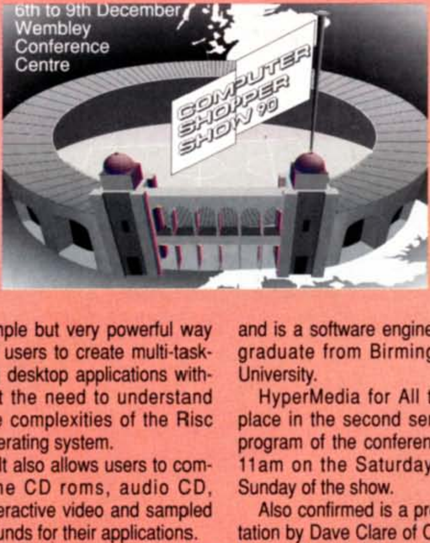
The new lessons come on an 80 track 5.25in disc for the BBC B, Master and Electron with AP4 at £20.95. Parts 1 and 2, which include lessons 1 to 32, cost £36.95.

They are also available on one 3.5in 80 track disc or two 40 track discs for BBC B, Master, Compact and Electron with +3/AP3 or Archimedes with 6502 emulator for £21.95 parts 1 and 2 for £38.95.

Latest technology goes on show

VISITORS to the Acorn Conference at December's Computer Shopper Show will find themselves at the forefront of HyperMedia development.

Market leader Software Solutions have chosen the event for the first public showing of their new HyperMedia package Genesis 2, due to be launched in January next year.



This coup is just a sample of the impressive line-up of companies which will open the doors on developing technology to make the conference a must for all users of Acorn machines.

Speaking on HyperMedia for All, Software Solutions boss David Tee will demonstrate how easy it is to achieve excellent, quick results with Archimedes package Genesis, creating many pages of multimedia material.

Launched earlier this year, Genesis is aimed at both home and school use and allows text, pictures, animation and sound to be joined in a comprehensive framework.

Genesis 2 takes the fundamental ideas of Genesis and extends them to provide a simple but very powerful way for users to create multi-tasking desktop applications without the need to understand the complexities of the Risc operating system.

It also allows users to combine CD roms, audio CD, interactive video and sampled sounds for their applications.

David Tee wrote two of the original programs on the first Welcome tape for the BBC Micro.

He has been involved in the MEP project for a year and helped produce the Micro Primer package of software and support for primary schools.

He has also been involved in the production of multi-user BBC database Super Store, and is a software engineering graduate from Birmingham University.

HyperMedia for All takes place in the second seminar program of the conference at 11am on the Saturday and Sunday of the show.

Also confirmed is a presentation by Dave Clare of Clares Micros, Acorn's longest standing third party software house. His topic will be Schema – A Spreadsheet for all the Family.

One of the latest packages to be released, Schema is for Archimedes and BBC A3000 and Dave will show how it can be used in a variety of situations in business, home economics and education.

The Schema seminar starts at 12noon on the Thursday and Friday of the show.

Giving a rundown of Risc technology so far and a look at its potential will be members of Acorn's Risc development team.

Risc was originally proven at Berkley University in California and is viewed by many as the way ahead in processing technology.

Acorn is at the forefront of this technology and the team will show how Risc differs from conventional processor technology, scanning its development this decade.

Risc Technology in the 1990s starts at 4pm on the Thursday and Friday of the show.

More details of other conference topics and speakers will be given in next month's issue of *The Micro User*.

The Computer Shopper Show takes place from December 4 to 9 at Wembley Conference Centre.

Admission for adults is £5; children under 16 £3.50 with £1 off for advance tickets and a pre-paid family ticket available at £12 for two adults and two children.

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The card itself will support drives with a maximum of 8 heads and 1024 cylinders. This gives a present total maximum capacity on any one drive of 86MB.

The podule comes in a colour coordinated steel case which fixes to the rear of the A3000. The hard disk mechanism is enclosed in a separate steel case (also colour coordinated) with switch mode power supply and whisper quiet fan to ensure that the unit remains cool. This unit is connected to the ST506 podule via centronics type shielded cable to prevent any RF interference from the hard disk and podule.

20MB and 40MB hard disks are supplied as standard but other sizes are available on request.

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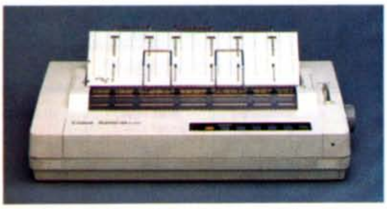

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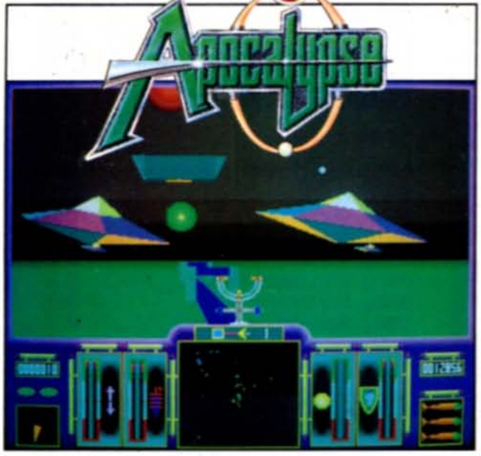
THE 4TH



APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

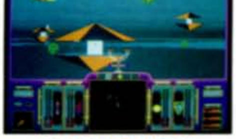
The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

PRICE: A3000/Archimedes £29.95



A3000/ARCHIMEDES

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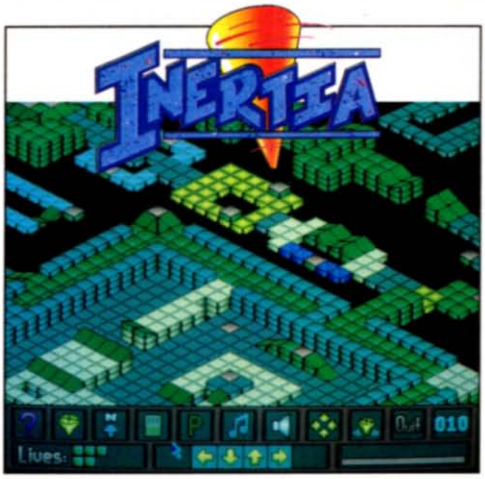

INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

Electron User Golden Game May'90

BBC Micro and Acorn Electron versions available ***NOW****.*
Enhanced Archimedes version available in June, 1990.

PRICE:		
	A3000/ Archimedes	**£19.95**
	BBC B/Master 5 1/4" disc	**£12.95**
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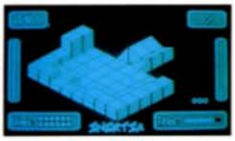
	BBC/Electron Cassette	**£9.95**

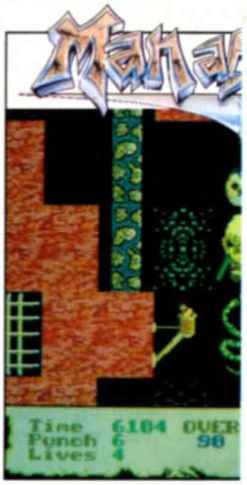
BBC B/MASTER



ELECTRON

A3000/ARCHIMEDES

A3000/ARCHIMEDES



MAN-AT

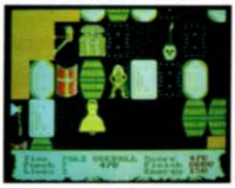
In the age when the castle was supreme it took dedicated warriors to overcome their defences, to loot and pillage, and finally to destroy.

You are armed with a mighty sword cast from the remains of a thunderbolt which fell from the sky many millennia ago. Also in your possession is a magic potion which makes you invincable to all for short periods of time. Armed with these you must penetrate the inner recesses of 4 castles and do battle with all you find in them.

As you progress you will discover many intriguing objects which can behave very strangely. Many are documented such as wooden panels, hour glasses, thorns, portculli, mirrors etc.. But most are

PRICE: A3000/Ar

A3000/ARCHIMEDES



A3000/ARCHIMEDES

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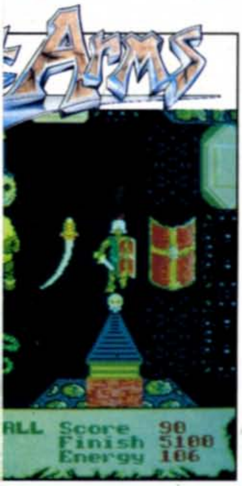

T-ARMS

not. When you think your stuck, experiment and you'll discover properties you never knew existed.

The subtle blend of arcade timing and adventurous puzzles make Man-At-Arms fiendishly addictive. You must plunder each of the 4 castles which become increasingly "puzzling" as you progress. Your overall objective is to kill all foes with your mighty sword and to plunder as much of the most valuable treasure as you can carry.

Man-At-Arms is a fascinating challenge with superb sound effects and music. No attention to detail has been spared and you can be sure of many late nights for weeks to come.

chimedes £19.95

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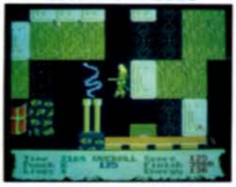

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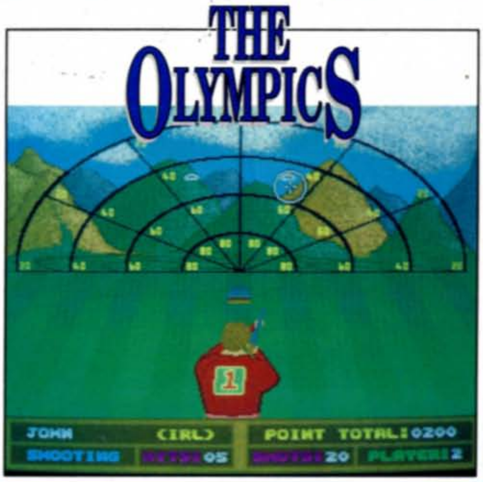


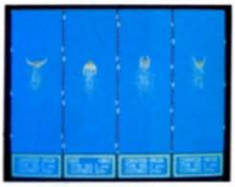
THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner.

PRICE: A3000/Archimedes £19.95



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WORLD RECORDS

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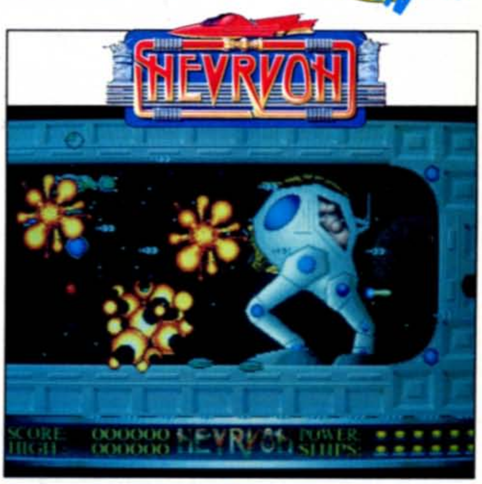


NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is second to none.

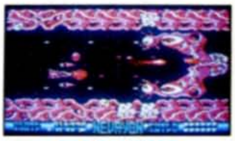
It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

*BBC Micro version available **NOW**.*
Enhanced Archimedes version available in June, 1990.

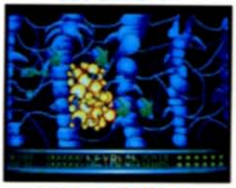
PRICE:		
	A3000/ Archimedes	**£19.95**
	BBC B/Master 5 1/4" disc	**£14.95**
	Compact 3 1/2" disc	**£15.95**

BBC B/MASTER



BBC B/MASTER

A3000/ARCHIMEDES



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THE *FASTEST* ARCHIMEDES LASER PRINTER

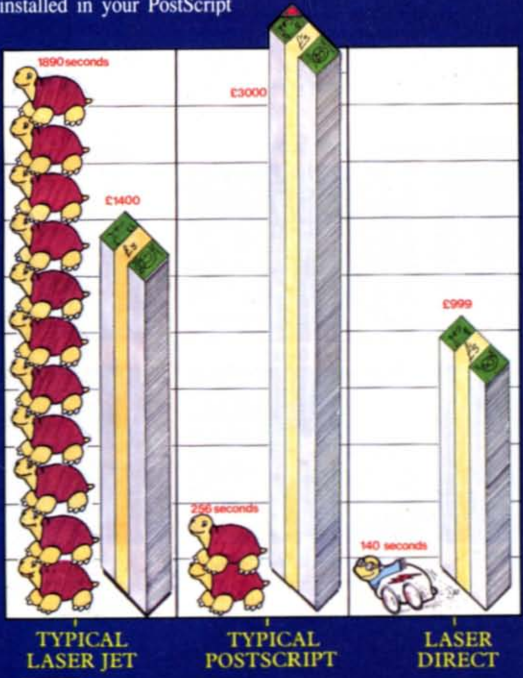
The LaserDirect consists of an interface board, our RISC OS printer driver software, and a special version of the 300 dpi Qume six page per minute printer. Because the board drives the printer 'engine' directly, not only does this save a complex controller board usually resident in the printer, but it also means it prints very much faster than traditional printers. The speed is a combined result of our optimised RISC OS printer driver, the RISC processor and the unique 2Mbit/second data link to the printer. One other significant advantage is that the LaserDirect uses the Acorn outline fonts installed in the machine, so guaranteeing all fonts seen on screen will print - no need to make sure the fonts match those installed in your PostScript printer.

The result is a printer whose quality is the same or better than traditional lasers, that can use all RISC OS outline fonts, that is faster than traditional printers, and costs less.

The Qume Liquid Crystal Printer is not technically a laser printer. Instead of having a laser and spinning mirror arrangement, this printer has a conventional light source shining through a liquid crystal shutter array. The result is fewer moving parts, a lower cost and a more reliable printer. It also occupies a very small amount of desk space—42cm by 42cm, no more than a standard dot-matrix.

Special features - Software on board means it is always available and can be automatically installed on startup - no loading from disc • The LaserDirect offers special links to other Computer Concepts software. For example, when combined with the new Scan-Light Plus software, it offers a direct scan to print facility. It can scan and print a full A4 page in under a minute. • A PostScript compatible interpreter will also be available, turning the Archimedes and LaserDirect printer into a very fast PostScript compatble printer (but using the Acorn outline fonts).

LaserDirect Qume (incl. printer, interface board, and software)
£999 +VAT & carriage



Compatible with all applications that use RISC OS printer drivers, e.g. Draw, Paint, Pipedream, ADP, Impression etc.

Graph shows time taken to print a typical 10 page document with a selection of different fonts, together with typical price.

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UPDATE

Olly for the Arc

OLLIE the Octopus has now got his tentacles round Archimedes machines with two new conversions from Storm Software (0963 22469) – Ollie Octopus Sketchpad and Amazing Ollie.

Suitable for children of four upwards, they include many improvements on previous versions – mainly the addition of mouse input.

Sketchpad gives children an opportunity to draw imaginative pictures on screen. Using eight colours, they can draw lines in eight different directions or build circles, squares and triangles which can be enlarged, reduced or shaded then used to build up the picture they want.

Ollie helps with on-screen instructions, there is a demonstration loop which draws the picture of a castle shown on the front cover of the package and also a save option.

Amazing Ollie promotes hand and eye co-ordination, number recognition, adding and counting with children challenged to guide Ollie through a randomly created maze to catch fish. There are four options – Counting Fish, Finding Fish, Beat The Clock and Advanced Option.

Both programs are already available for BBC Micros, and the new Archimedes versions cost £16.04.

Ollie Octopus Sketchpad
Amazing Ollie

Ollie spreads his tentacles

Software surveyed

IN the UK, where there are more educational music software packages available for BBC Micros than for all other computers put together, help is now available for teachers faced with finding the best package for their needs.

Hybrid Technology (0223 420360) has conducted a comprehensive survey covering nearly 60 of the most popular packages which run on unexpanded BBC Micros and has published the results in a 20-page booklet which includes description, price and supplier of each package.

Teachers can obtain the booklet for £4.30 including postage and packing and it is also being included free with Hybrid's Music 5000 Synthesiser Universal, the £99 add-on which replaces the computer's "beep" with stereo instrument sounds.

Subjects covered in the booklet range from musical composing in the classroom to instrument practice at home. Orders should be sent to Hybrid at 273 The Science Park, Cambridge, CB4 4WE.

Dealer's At Home

AN increasing number of schools are taking advantage of Acorn's Home and School scheme launched earlier this year. One of the latest is Willink School, Burghfield Common, which invited local Acorn dealer MAV to a recent open evening. Several hundred teachers and parents took advantage of this chance to learn more about the importance of computers in education.

"Computers have become an integral part of the school timetable over a relatively short space of time", said deputy headmaster David Mills. "For this reason, it is of particular help to teachers as well as parents to be able to develop a relationship with local dealers through this type of event".

The wider View

INFORMATION Education (0782 281643) has launched an addition to its Viewbook range of educational software packages, the first in a new Geography for the 1990s series. It covers recreation and tourism and has been written by Dr Ian Selmes, the head of geography at Oakham School who has also prepared a doctorate on how

➤

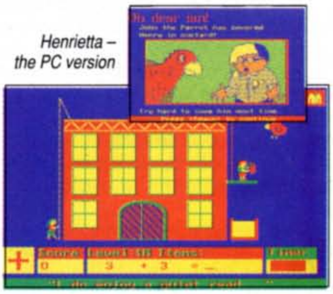
Help from Henrietta

DUE for release soon is a BBC Micro version of Henrietta's Book of Spells, billed by developer Scetlander (041-357 1659) as "a program to help improve the nation's spelling".

Based on five different game-like exercises, it has three skill levels and a choice of words from five to nine letters. Word lists may be used as supplied or edited to suit individual requirements. Users can replace words with those of a foreign language.

Exercises are linked to a storyline featuring Henrietta, Hopeless Henry, Cedric the Skeleton and Morgana the Morbid.

"Educational software is all too often thought of as boring and dry. Unfortunately, much of it is", said Ron Lander of Scetlander. "A program like this is, in fact, deeply absorbing and great fun to use. It employs a strong game element but is quite different from other programs". Already available on other formats, the new package will cost £14.99 when released in October.



Henrietta – the PC version

Touch and learn

CHILDREN with learning difficulties can often be denied the educational benefits of a computer because of the complexities of operating its keyboard. This was one of the major problems at Beaufort School, Birmingham, which has 50 pupils with severe learning difficulties.

Now the Birmingham youngsters are enjoying their computing by choosing preset commands by simply touching the screen. With the Touchtech 501 from Microvitec (0274 390011) they develop motor control, eye-to-hand co-ordination and the motivation to use computers. Older pupils use it to learn languages, number and shape discrimination and word-matching.

The touchscreen has also given non-technical teachers confidence with computers and has improved the concentration levels in fully able children.

"We are very encouraged with the success of the Touchtech 501 at Beaufort", said Microvitec's business manager for education, Ken Hardy. "It demonstrates how innovative monitor technology can provide the vital interface to computers and open up new horizons for those with severe learning difficulties".

➤

teachers can encourage independence in learning. The new Viewbook contains several question and answer pages as well as detailed decision-making exercises with accompanying mark scheme for teachers. Aimed at GCSE pupils, it includes a depth and breadth of information on recreation and tourism in Britain, considered to be of value to all students on the subject.

Edited by Nick and Roz Foskett, the Geography for the 1990s series will include 12 further titles. They will follow the same format as previous Viewbooks, with students using the keyboard to turn pages of text, add their own notes, copying relevant parts to disc, and turning up cross references.

Available for both BBC Micros and Archimedes machines, Recreation and Tourism Viewbook costs £28.50.

Latest lines

ALREADY looking towards the BETT Show in January, ESM (0223 460557) has given *The Micro User* a preview of the new products it will be showing for BBC Micros and Archimedes machines.

Factory is a BBC Micro program which offers pupils the challenge of creating geometric product to a specified design and has been developed to stimulate discussion and collaborative work. In the scenario of a factory, their task is to build an assembly line for the product selecting from a range of machinery. With various levels of difficulty selected by the teacher, Factory costs £28.75.

Time Traveller is a versatile history database designed to develop chronological thought and correct historical perspective in pupils of all ages. Its framework can be used by students to input local, national or personal data on any topic to produce their own timelines. Also for BBC Micros, it costs £43.12.

Mathematics from China is the latest offering from Anita Straker, the author of Puff, the mathematical adventure set in China. A photocopiable resource book, it includes various activities on every aspect of Chinese life including rhymes, design, pictorial number characters, number system, the Chinese people and their lifestly. To be used in conjunction with Puff, it costs £20.12.

ESM has now published the 1990 Folio Catalogue, a complete guide to its entire Folio range of word processor programs for BBC Micros. It caters for English, French, German, Panjabi, Hindi, Gujarati and Bengali. It also offers extra components so schools can tailor it to individual needs.

ESM is now putting the finishing touches to its word processor and DTP package for Archimedes machines. Due out at the end of September, it will cost around £90 standalone with primary schools licences of about £250 and secondary school licences of £375.

Meet the mouse

DEVELOPED with the aim of teaching infants how to use mice, Tiny Draw is the latest offering from Topologika (0733 244682). It's an easy-to-use drawing program written specially for infants using the A3000.

With brush, shape, fill and colour menus accessed through icons and pointers, it allows children to create their own full-colour pictures then save their screens to disc and print them out on any printer supported by Risc Os. All these features can be turned on or off as desired by a special configuration so that the disc can be tailored to suit particular needs.

Tiny Draw costs £28.75 plus £1 postage and packing. It comes with a comprehensive teacher guide and a second program, Tiny Logo, which is "a gentle introduction" to the popular Logo language.

Showcase labs open

TWO showcase teaching laboratories equipped with powerful networked Archimedes and Unix systems have been opened at Stirling University under a joint funding exercise by the university and Acorn.

Already established as a reference site for Acorn-based computer solutions for social sciences and policy studies, Stirling is the home of SocInfo, the national computer centre for sociology and social policy.

Responsible for the formation of the two new laboratories are Professor Duncan Timms and Dr Gerry Orchard, who have been working with Acorn for many years.

"The new Acorn machines present a wide range of exciting new teaching opportunities", said Dr Orchard. "We will be demonstrating real products to academics in the social and policy sciences, illustrating the spread and integration of software used in these fields of teaching and the benefits of networked solutions".

Stirling is acting as a trial site for new Acorn TCP/IP communications software to allow Archimedes computers to be fully integrated with Unix systems.

Also forging new computing frontiers is the university's Department of Psychology, which runs two Archimedes-based laboratories for students studying artificial intelligence, cognitive neuropsychology and neural computation.

Defining the keys

THE problems of adapting existing software to run with a Concept Keyboard have now been removed by a new product from Norway. Called Rock, it's a Risc Os Concept Keyboard definition program for use with A3000 and Archimedes machines.

For defining customised Concept Keyboard overlays, it consists of a special module of software which, when loaded, intercepts Concept Keyboard commands and converts them into those which the existing program expects.

Up to 10 overlays are provided at the same time, giving users in effect 1,280 cells and 326,400 characters. It works with most programs and any Concept Keyboard.

Allowing full mouse emulation, Rock has been developed by The Rehab Centre, Nesoddtangen, Norway and is available in the UK through Widgit Software (0926 885303).

The CJE ARM 3 Upgrade + SUPER BOOSTER

The CJE ARM 3 runs at 30 MHz, but with the our optional ARM 3 Super Booster it will allow you to run your CJE ARM 3 at higher speeds.
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Down in the dumps

Frank Jukes takes some time out to enjoy a new version of a highly educational program

SHERSTON Software have an enviable and well-deserved reputation for quality educational software and this version of *Stig of the Dump* for the BBC A3000 and Archimedes series will do nothing to harm that reputation.

Already available for some time on the BBC B, B+, Master and Compact, Stig has now been released for the Archimedes with improved graphics, a few changes to the adventure tasks and a significant increase in speed. The map and the words that are used are, however, identical.

The adventure comes on two discs. The first is a startup disc which cannot be copied but is used, as its name implies, to start the adventure before being removed and replaced by the user disc . This latter can, and for safety's sake should, be backed up.

This system means that the adventure may then be run on several machines at the same time, a typically thoughtful gesture by Sherston. It also means that games may be saved by differing groups of pupils on their own discs and so precious files are then safe from accidental – or otherwise – overwriting.

Aimed at children between 9 and 13 years of age, Stig of the Dump is intended to encourage them to read a text for meaning and for understanding. In other words, it is Information Technology's answer to the comprehension exercise.

The text in this case is the first three chapters of the long-time favourite, Stig of the Dump, by Clive King. With knowledge gained from these chapters, the pupils have to identify and then complete a series of tasks.

Unlike the traditional comprehension exercise, Stig doesn't stop there. As the excellent and very helpful Teacher's Book points out, the program develops other skills such as mapping which is essential when working on the program if progress is to be made at a sensible speed and provides opportunities for art, drama and written work of many kinds.

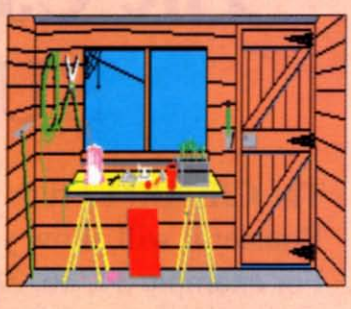
Just to prove the point and, no doubt, to bring a smile to many a harassed teacher's face, Sherston have included a flowchart based on the requirements of National Curriculum Science complete with attainment targets. This not a token gesture though – the suggestions it makes are wide ranging, offer first hand experiences for the children and are above all relevant to both the program and an integrated cross curriculum approach.

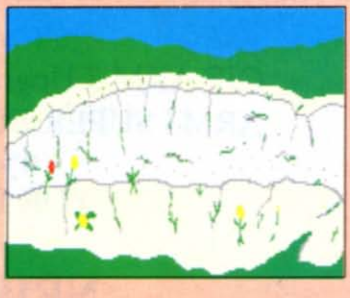
Opportunities to develop and extend information technology skills are also included. As Sherston point out, the pictures used in the program are standard sprite files suitable for use with an application such as !Paint or, for example, for use with 4mation's Jigsaw.

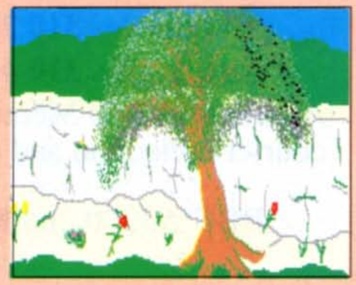
This means that for those who are feeling particularly adventurous it is possible to alter or even create new pictures to illustrate the various locations. I don't think much could be done to improve the massive screen which the children are presented with when they complete the adventure, but I am sure that it would be very impressive when loaded into Jigsaw.

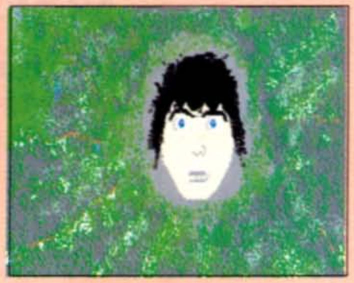
The excellent graphics add another dimension to the story without at the same time detracting from it by discouraging children from using their imagination. They contain just enough information to work with the text in providing cues and clues and a great deal of thought must have gone into them.

Product: Stig of the Dump
Price: £21.50 plus VAT
Supplier: Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH
Tel: 0666 840433







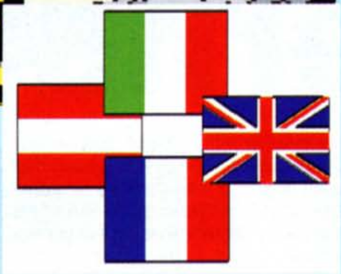


What is interesting is the way that they add atmosphere to the adventure. It took me a while to realise how it was that the interior of Stig's shelter seemed to be dark and almost claustrophobic: The colours used in the border to the picture had been changed. I prefer to approach work such as this with mixed ability groups of preferably three and certainly no more than four children in sessions of about one hour. With this arrangement the problems in the game can be solved by upper juniors over a period of no more than two weeks.

Groups collaborating with each other would, of course, speed things up but although there are many positive whole

Product: !Help (Booklet with disc)
Author: David Eccles
Price: £6.95 (4.95 until end of October)
Supplier: Sherston software, 8 Court Street, Sherston, Malmesbury, Wilts SN16 0LL
Tel: 0666 840433

Handy helping



Not so self-assured with your A3000? Ian Dickinson helps you open the door

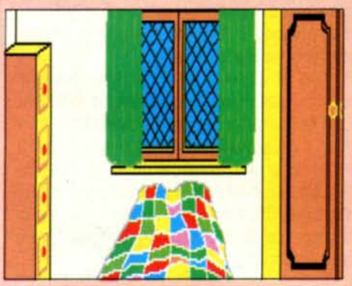
IF you are still learning how to use your Archimedes series or BBC A3000 Sherston Software has produce an extremely helpful guide called !Help. It is an apt name if ever there was one.

This 93 page booklet, which comes in a pocketable A5 size, is split into two main section, the first a broad introduction to the micro and the next is tutorial based, showing the principles of how to use the supplied software !Paint and !Draw.

These applications are provided on a disc that comes with the booklet. The disc also contains utilities to configure the system without having to use the Task Master. By selecting the appropriate icon the micro will be set up to your requirement, say for creating a ram disc or selecting sprite size.

The booklet takes you through the basics of using the computer and the DeskTop environment in a logical manner and is easy to get to grips with.

The section dealing with the applications packages provided is excellent. It is a real snip at this price.



Well done!

You've collected all the treasure.

Goodbye from Stig and Barney.

class behavioural benefits from such collaboration and co-operation, much of the excitement and pleasure of discovery and problem solving is lost.

And it certainly generated a lot of excitement and pleasure even in the attempt to simply to fall over a cliff – Barney did it more easily in the book.

Working your way through at least part of the program is well worth the effort, and a lot of fun, and helps you to appreciate where the children may need help or where the book may need some explanation, especially when using it with younger children.

A full solution and a map are provided in the Teachers' Book for those who are unable to solve it for themselves for whatever reason...

Help is provided by entering HELP or HINT but it is fairly cryptic. For example, in response to HELP when in the pit early in the game the response is *Where is Stig?*. Helpful, but not too helpful and just what is needed. It is also possible to provide help by printing out a list of words which the program understands. A careful look at the list when lost for an idea will sometimes provide a spark to a line of inquiry.

If you would like a closer look at Stig Sherston Software run an excellent inspection service which allows you to have the software for 28 days before you need to make a decision. Alternatively, if you already have a BBC Micro or Master version and wish to run Stig on an Archimedes as well, for only £5 Sherston will supply a suitable copy. Excellent value.

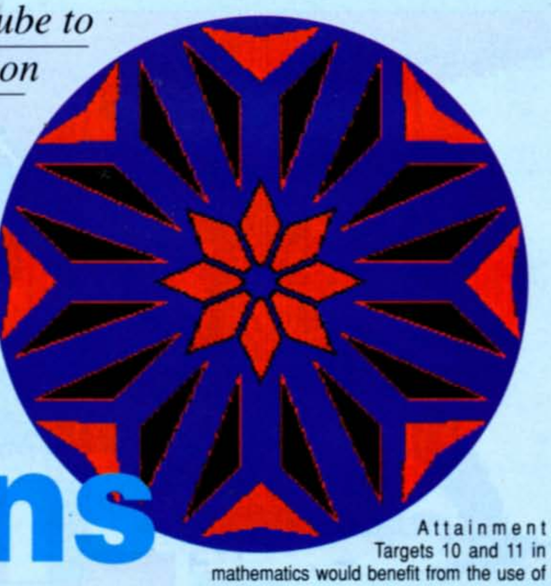
Summing up

I can recommend Stig of the Dump without hesitation. It may not stretch the Archimedes to its limits – and not much software comes close to doing that even on the Master – but it does provide a taste of its capabilities and uses its speed to present an educationally sound package well.

Ian Dickinson peeks down the tube to see what's new in display creation

Product: Kaleidoscope
Price: £35.00
Supplier: ESM, Abbeygate House, East Road, Cambridge CB1 1DB
Tel: 0223 65445

Pretty patterns



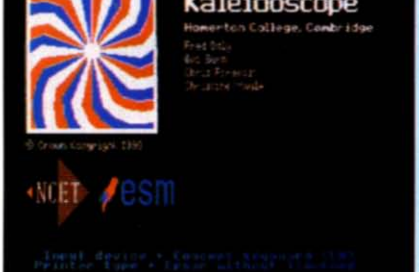
KALEIDOSCOPE is not so much a computer program for mathematics, rather a classroom tool for enhancing aspects of mathematical concepts. Development of the software has been sponsered by NCET and developed at Homerton College, Cambridge. This combination has produced some excellent curriculum software in the past, so my expectations of Kaleidoscope were very high.

The idea is to encourage pupils to investigate shapes and manipulate them by rotation and reflection, all of which is shown on screen. Various colours are available for the drawings. The shapes that are produced are then reflected and rotated around a centre point. Work can be printed.

The program can be configured to be used with a variety of input devices. The software supports the use of Concept Keyboard, A3 and A4, left and right hand versions, joystick, AMX mouse / Megamouse, Grafpad 2, Marconi trackerball, Cumana touch pad and a touchmaster.

Configuration is invoked by typing *SYSTEM. The software to set up your system is run, and simple selection techniques enable you to choose all your requirements.

When the software is configured to your requirements, simply select "End the system program" and your options will be saved to disc for immediate use on subsequent ocassions. Remember to take off the write protect sticker before you exit the program.



The program itself is very slick. It still amazes me how programers squeeze such sophisticated systems out of the 8 bit BBC Micro. Once running, the software is operated either by using the cursor keys, the selected input device or by function keys.

The most appropriate method is a very individual choice, so having this selection is important. The program uses the cursor to draw designs and pictures. Selection of the various options is also controlled by cursor movement or function keys.

Drawing the designs is simple. The pen is either up or down. When it is down lines are drawn by using Return to select cursor positions and connect points together. Shapes can be filled in with colour selected from a palette and manipulated using symmetry boxes. Angles of symmetry can be changed to you wish.

Once you are familiar with the process it is possible to create intricate patterns and colours. My first and fourth year pupils used the program for an initial two hours: The results were very impressive and the pupils were well motivated using the software.

Work can be saved, reloaded and erased when required using the Disc box. This, too, is nice and easy – just move the cursor to the picture of the floppy disc, select it, then choose the option required.

Various printers are supported and it is possible to select yours when using the *SYSTEM program. Those supported are Epson black and whites, Integrex Colourjet, Canon PJ-1080A, Star LC10C and Radio Shack CGP-220.

Not only is this piece of software an excellent enhancement to the mathematical principles of rotation and reflection, it also relates directly to the National Curriculum. Attainment Targets 10 and 11 in mathematics would benefit from the use of this program.

A.T. 10 states that *Pupils should recognise and use the properties of two-dimensional and three-dimensional shapes.* A.T. 11 says that *Pupils should recognise location and use of transformations in the study of space.* The program can be used across many A.T.s at differing levels and advise and suggestions are given in the documentation.

The pack comes with a copy protected disc (either 40 or 80 track), crib card, function key strips and overlays for Concept Keyboards. Although the disc bears a lifetime guarentee in case of accident, I do not like using master discs. Accidents do happen, and it is inconvenient sending a disc to be replaced if it is being used as part of current classroom activity.

The A5-sized booklet contains a wealth of information within its 45 pages. It is well laid out and the teacher's guidelines section is particularly useful. It gives ideas for starters, a mathematical guide to Kaleidoscope, and shows its relevance to the National Curriculum. The case studies of various schools use of the program were very informative.

Summing up

Kaleidoscope will be an excellent classroom aid, especially when used in mathematics, but it could be used elsewhere within the curriculum. Guidance is required so a teacher needs to be fully familiar with the package's operations.

Overall, it's a tremendous aid and both myself and the pupils enjoyed using it. The supplied material is well put together and the choice of input devices is well taken care of. A lot of thought has gone into producing this program and it well deserves to be part of the mathematics software library.

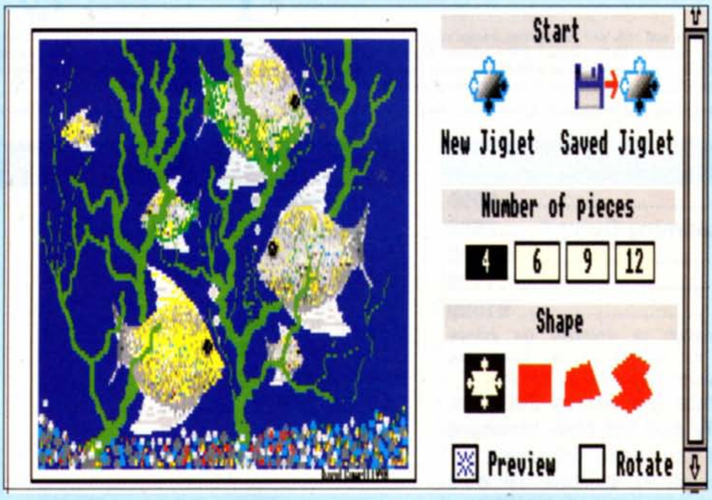
Primary puzzler

John Clemence pieces it all together

FOLLOWING the success of its Jigsaw package, 4Mation has responded to suggestions and requests for a similar program for younger users. Jiglet is the result of this effort and turns out to be a worthy successor.

The idea is that any screen (or sprite) that you have saved from an application can be turned into a jigsaw which can then be solved by manipulating the pieces on the screen using the mouse. The beauty of using a computer to make and solve jigsaw puzzles is that there is always a new picture around for you can make into a puzzle – and you never loose the pieces!

To start, you double click on the !Jiglet icon and when it has loaded drag your pictures, jigsaw or jiglet files on to the application. Once there the choice screen appears, as shown in Figure I.



The choices at this stage are deliberately limited and very easy to make use of. This is a great improvement over Jigsaw, where you had to refer to the manual to find out what sort of Jigsaw you would get.

There is a new option which allows for different types of pieces. So it is possible to use rectangles for the very young while older children canbe faced with more complicated irregular shapes.

The pieces can also be rotated, so that by combining all these options it is possible to create anything from simple four piece jigsaws with rectangular pieces to quite difficult puzzles – at least I found them difficult – where there are pieces which are irregular, rotated, and wihtout a preview facility.

Figure II shows the main working screen with the pieces laid out at the top. The bottom left hand window shows either an enlarged image of individual pieces or a completed copy of the picture. This preview option can be turned off.

The bottom right hand section shows you how far you've progressed. You can toggle the background colour from black to white if this makes the pieces easier to see. You can also save a partly completed puzzle for later completion.

To work on the puzzle you point at the piece you want to place, press select, then either point at the work area – the bottom right hand corner – and press select again, or press the menu button. At this point the whole screen changes so that the jigsaw now fills it. You then use the mouse to move, rotate or place pieces.

I found that you could not leave pieces overlapping to make room for fine adjustments, and it is not possible to slide a completed block of the puzzle – each piece has to be moved separately.

Jiglet comes with a number of pictures saved in a special form which takes up less disc space, and the software allows you to turn your own pictures into these compressed files,

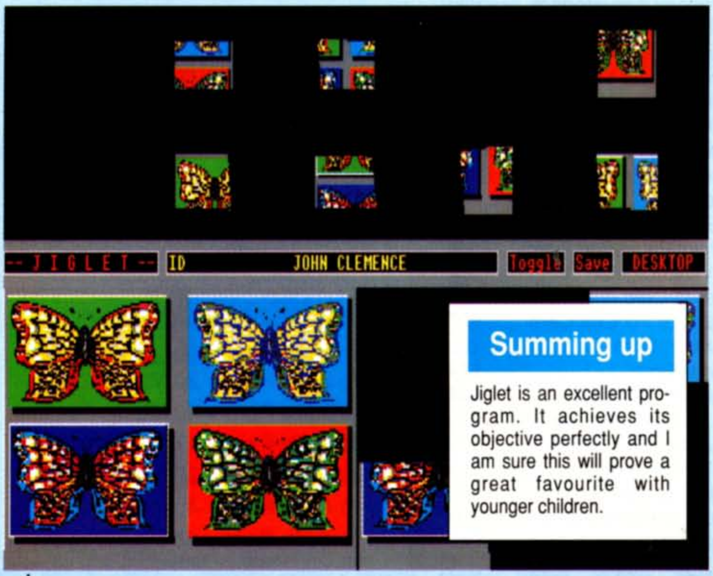
The pictures supplied with the package are suitable for younger children. They are for the most part simple and brightly coloured and use themes appropriate to the age group. They are also compatible with the pictures supplied on the Jigsaw discs.

Incidentally, another package from 4Mation – Snippet – will let you take just about any screen from any application and turn it into a Jigsaw or Jiglet file.

I only experienced one minor problem. Using a BBC A3000 fitted with a Midi podule I found I did not have enough memory to start my puzzle.

A message sending me to the task display with no further guidance from the manual was not appreciated.

Product: Jiglet
Price: £29
Supplier: 4Mation Educational Resources,
Rock Park, Barnstable, Devon. EX32 9AQ
Tel: 0271 45566



Summing up

Jiglet is an excellent program. It achieves its objective perfectly and I am sure this will prove a great favourite with younger children.

Dabhand Computing Ltd.

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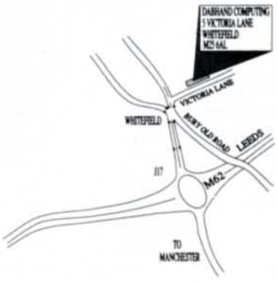

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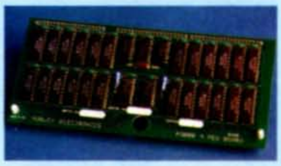

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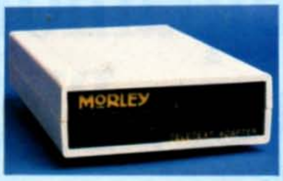

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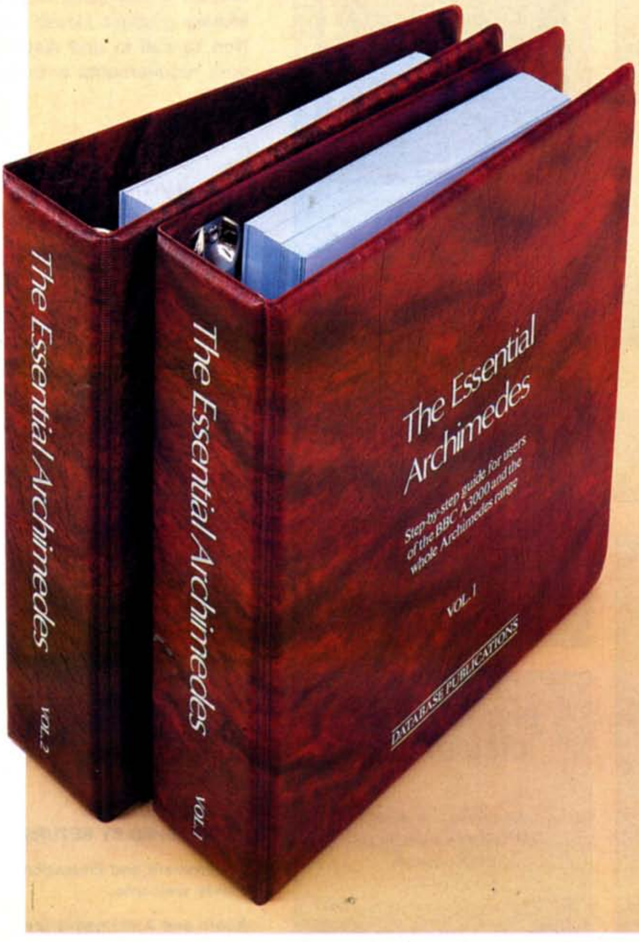

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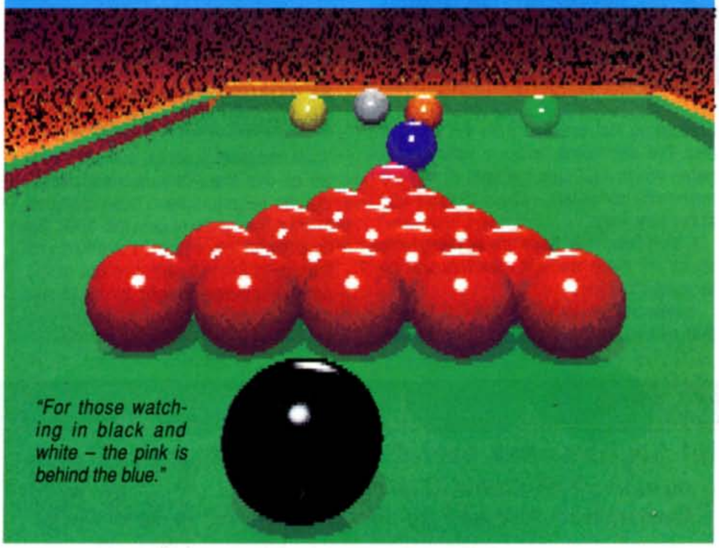
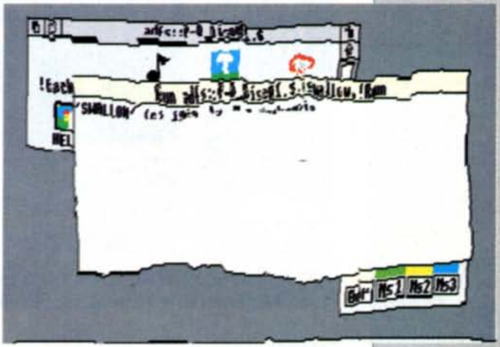
Hyperactive

In the season of mellow fruitfulness, Teri Paul harvests the PD crop



"For those watching in black and white – the pink is behind the blue."



Swallowing the screen

IF you are unsure why there is all the fuss about Hypertext-type products, Nick von Sommerton's !Hyper could explain. Now added to the public domain, you can find it on this month's disc for subscribers to *The Micro User*.

Similar to the Macintosh's Hypercard – and !Genesis and !Bookbinder on the Archimedes – !Hyper is, in principle, a relational database.

Picture a flowchart of the type you were forced to do at school but have ignored ever since and combine this idea with a picture of a tree root system, add the ability to index text and graphics at random and you've got Hypertext.

Its programs allow you to link between text windows/boxes and images to produce a database-type system as complex or as simple as you wish.

The applications are amazing. If you ever look at an Apple Mac PD catalogue you'll see what I mean. But the beauty is that you don't have to be a programmer to use or to write your own applications.

Good preparation is vital though – make sure you have your !Edit, !Paint, !Draw and so on files saved before you start. To do this you'll have to resort to a good old piece of paper and pen.

So far I've only seen sample files which are really adverts. I look forward to a good graphic adventure though – you know, click on the table and then you can see what's there.

OK Jimmy

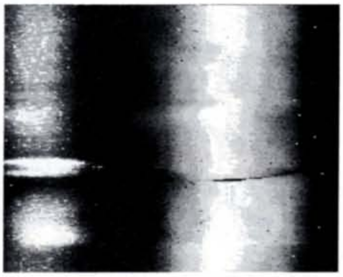
Baby Blues have been making me feel paranoid for several months now, following me around. So it was with some relief that I turned to Jimmy.

For a start the eyes are smaller, even though they do still follow your mouse around. But being the good Scot he is, he has a glass of something long and cool. Click on him and he will down the beverage with obvious relish, a devilish addition to your best friend's Archimedes throughout the dry spell.

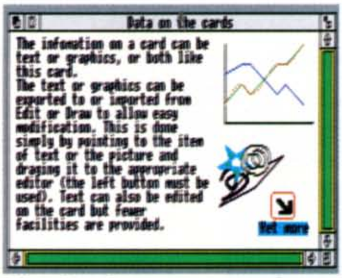
A missive from The Netherlands arrived this morning promising all sorts of PD goodies.

Intrigued I've written for more information and I will report on my findings soon. If you

➤



Seismology made easy



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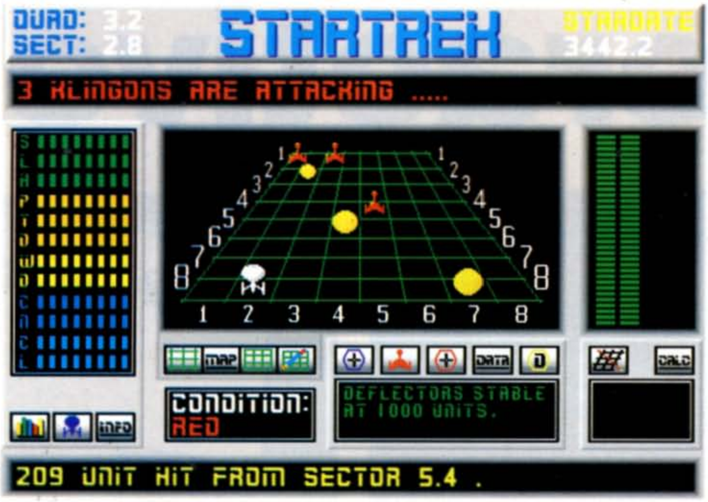
!Hyper in action



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A blast from the past

I happened on a music file a couple of days ago which is an excellent arrangement for the 32 bit machine of a famous piece by Erasure so I've included it on this month's disc. I've also come across a version of a game which first saw the light of day on mainframe computers – about 15 years ago at the very least.

Called Star Trek, there are as many variations are there are split infinitives and on as many machines.

It now seems to be a matter of honour that every computer should have its own version – now you can play it.

Talking of blasts, I received a whole disc from the Camborne School of Mines. If you are interested in geothermal energy and granite outcrops you'll find the disc both informative and educational.

There are some nice seismic sounds too which could persuade people that your Archimedes is about to erupt or has a very bad case of wind.

The monthly disc

You'll find most, if not all, of these goodies on this month's subscription disc. But the programs have been archived to cram the 1.6Mb of data into 800k. So double click one of the archive files and then drag the relevant files out of the archive window before trying to run them.

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GOTO HELL!

Nigel Peters stirs up a cauldron of trouble with an investigation of GOTOs

> *"The GOTO statement should be abolished from all higher level programming languages...."*
> – Dijkstra.

IF there's one thing that's guaranteed to get computer people hot under the collar and to generate more friction than light, it's the subject of structured programming and GOTOs. It should be placed with religion and politics as one of those things that are best not talked about.

But where did this controversy spring from? One possible starting point was an academic paper by the famous (notorious) Dijkstra called "Programming considered as a Human Activity" published in the early 60's. In it there are:

- The arguments against GOTO.
- The new idea of top-down design.
- The emphasis on program correctness and quality.

It's a brief summary of the basic aims of structured programming that can hardly be bettered. In Dijkstra's view, programming had moved on from the concerns with efficiency that typified its earlier days and now reliability was the goal.

In this "divide and conquer" attempt to allow mere humans to master the complexity found in really big programs, the parts of the problem being solved were subjected to Dijkstra's principle of non-interference, which states:

- *The correct working of the whole can be established by taking into account their exterior specifications only.*

Which means that programs, sub-programs and so on, should be black boxes where what goes on inside is invisible to the outside except in terms of input and output.

- *The individual parts can be conceived, constructed and tested independently from one another.*

If each part is a black box you can test that it is, itself, correct without having to write the whole program first.

So if your overall scheme is right you can get away with just making sure that both the individual parts of the program – subroutines, procedures or whatever – and their *joins* are correct.

In this method of problem solving "elegance, accuracy, clarity and a thorough understanding of the problem at hand are prerequisite." So the seeds were sown for the movement that was to become structured programming and step-wise refinement of programs.

Next, Dijkstra turned his attention to the GOTO, giving anecdotal evidence from a couple of managers who said that: "The quality of their programmers was inversely proportional to the density of GOTO statements in their programs. This has been an incentive to do away with the GOTO statement."

Apparently getting rid of the GOTO will automatically bring about an increase in clarity.

One point to note is that no real proof was put forward that GOTOs are bad, it was just assumed. But it was then that straight into the spotlight came proof that you don't need GOTO at all.

Bohm and Jacopini in "Flow Diagrams, Turing Machines and Languages with only Two Formation Rules" – a paper quoted far more times than it's ever been understood – showed that any flowchart could be drawn from combinations of the standard *structured* flowchart elements – sequence (one command following another), selection (IF or CASE statements) and repetition (FOR...NEXT, REPEAT...UNTIL or WHILE...ENDWHILE and others).

> **"I/O, I/O, it's off to work we don't GOTO...."**
> – from Snow White and the Seven Structured Programmers.

So, theoreticaly, no GOTOs are ever needed. But if the programming language you're using doesn't have the constructs to allow you to implement a GOTO-less B&J flowchart, you've got problems. Of course we're lucky, 8 bit BBC Basic has got enough constructs – just – while Basic V has plenty.

One point to note is that although the fact that GOTO-less programming was possible had been demonstrated, that it was practical or even advisable was another issue entirely.

As Dijkstra – who pops up everywhere – commented: "The exercise to translate an arbitrary flow diagram more or less mechanically into a jumpless one, however, is not to be recommended. Then the resulting flow diagram cannot be expected to be more transparent [more understandable] than the original one."

In other words: You can do it but is it worth it? This point still tends to be missed by some proponents of GOTO abolition.

Still in the forefront of things, Dijkstra popped up again, this time with his 1969 paper "Structured Programming". Here the aim was to give a methodology "to increase our programming ability by an order of magnitude" and hence to deal with complex, large programs in a manner that gave confidence that they were correct. As he

➤

"Oh, sinner man, where ya gonna GOTO?"
– Folk song.

"A program using GOTO is wirthless."
– Blaise Pascal.

pointed out: "Program testing can be used to show the presence of bugs, but never to show their absence!"

The questions he posed were: "For what program structures can we give correctness proofs without undue labour, even if the programs get large?" And: "How do we make, for a given task, such a well-structured program?"

He answered these with the statement that: "I have concluded that adherence to rigid sequencing disciplines is essential, so as to allow step-wise abstraction from the possibly different routings."

This is very high-powered stuff, but what it means is that write your program in the broadest possible way first then, very gradually, go into more and more detail.

He then went on to lay down the basis of structured programming, along with a sideswipe at GOTOs, with: "Sequencing should be controlled by alternative, conditional and repetitive clauses and procedure calls, rather than by statements transferring control to labelled points."

At this point in the history we have the initial stirrings of the movement towards structured programming with GOTO as the villain of the piece. But while it was known that any program can be made GOTO-less, the question remained: How do you create a GOTO-less one in the first place? Wirth proposed one answer in his 1971 paper "Program Development by Stepwise Refinement".

Here the emphasis was on the gradual development of a program in a sequence of refinement steps. The idea was that "in each step, one or several instructions of the given program are decomposed into more detailed instructions", bearing in mind that "it is natural to refine program and data specifications in parallel" and that each step implies a number of design decisions.

However there's no indication of which particular choice should be made at any stage – a point often overlooked by proponents of top-down structured programming. And despite this apparently simple method of handling complexity in programs, Wirth reminds us that "programming is not a trivial subject".

What's refreshing about Wirth's 1971 paper is that it doesn't raise the spectre of the GOTO. As we'll see, Wirth views GOTO-less progamming as the *result* of proper design and development, rather than getting rid of GOTOs bringing about good design.

In 1973 Donaldson published a paper "Structured Programming" which gave the aims of structured programing as not just program efficiency, but also producing reliable, maintainable, modifiable code.

It championed structured methodology as a way of minimising mistakes in the first place and allowing easy correction of any bugs that are found. It summed up with the fundamental message: "Simplify your control paths".

While he didn't go so far as to call for an outright ban on GOTO, Donaldson did say: "Much of a program's complexity arises from the fact that the program contains many jumps to other parts of the program – jumps both forward and back in the code. These jumps make it difficult to follow the logic of the program." adding that: "Compared to unstructured programs, structured programs are very easy to read and verify for correctness."

By now, the witchhunt against GOTO seems to have calmed down, with Donaldson recognising the value of GOTO used for abnormal conditions – like errors within loops.

In 1974, Knuth and Floyd published "Notes on Avoiding GOTO Statements" . This isn't as forthright a condemnation of GOTOs as might be believed from the title. While two rather technical methods of transforming programs into GOTO-less forms were given, the authors showed that a program can be more difficult to understand without GOTOs.

Work similar to this was done by Ashcroft and Manna in 1971, though their method of removing GOTOs came at the expense of having to use extra variables.

In the same year Wirth returned to the fray with an elegant summation of the story so far in the form of "On the Composition of Well-Structured Programs". He made the point that "structure enters the scene as the one essential tool for mastering complexity" and that "any amount of efficiency is worthless if we cannot provide reliability."

He also warned that the mechanical removal of GOTOs would usually result in clumsy code, saying that structured programming is a "systematic, orderly, and transparent approach", more "an attitude rather than a recipe".

The idea is that getting rid of GOTOs is putting the cart before the horse as designing programs in a structured, top-down fashion results in GOTO-less programs as the natural order of things. To quote:

"The method of stepwise decomposition and refinement of the programming task automatically leads to GOTO-free programs; the absence of jumps is not the initial aim, but the final outcome of the exercise. The claim that structured programming was invented by proving that all programs can be formulated without GOTO statements is therefore based on a fundamental misunderstanding."

The gospel according to Wirth is:

"Jumps must not be used in the initial conception of a general algorithmic strategy, and in fact should be delayed as long as possible."

With this it seems while GOTO hasn't been entirely rehabilitated, it does seem to have its place.

And to confirm this we have Knuth's paper, "Structured Programming with GOTO Statements", a deliberately provocative title. Here it's held that one major benefit of the elimination of GOTOs is that it forces the programmer to think. Knuth also makes a plea for efficiency (showing examples where GOTOs produce more efficient code) and for an escape structure – a sort of forward GOTO.

Finally, and most importantly, he pointed out occasions when a programmer might want to put GOTOs into his code – such as eliminating recursion.

And that's where this very short history ends. By now, in theory at least, the case for structured programming is more or less settled as a method of dealing with complexity.

While GOTOs are still looked at askance, they are tolerated in certain circumstances. In the Pascal User Manual and Report, the situation is summed up by Wirth as:

"A GOTO statement should be reserved for unusual or uncommon situations where the natural structure of an algorithm has to be broken. A good rule is to avoid the use of jumps to express regular iteration or conditional execution of statements, for such jumps destroy the reflection of the structure of the computation in the textual (static) structure of the program. Moreover, the lack of correspondence between textual and computational (static and dynamic) structure is extremely detrimental to the clarity of the program and makes the task of verification much more difficult."

So there may be rare cases for the use of GOTO in a structured program. However, it seems to be wise to take Dijkstra's advice and use them "as wise programmers, aware of our limitations".

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ROUTINE MATTERS

Another selection of your handy routines presented by Stephen Wade

This month featuring routines to...

- Convert temperatures
- Add *Wipe to the ADFS
- Print # out correctly
- Encode and decode messages
- Draw polygons in Logo

*Wipe your ADFS discs clean

Author : Alastair Cadman   Language : 6502 code   Filename : WipeSrc

ONE of the shortcomings of the ADFS filing system on the BBC Micro and Electron is the lack of a **Wipe* command. **Delete* and **Destroy* are implemented, but the former can only be used to erase one file at a time.

The latter is more useful as it deletes several files in one go, but only if they have parts of their filename in common.

What we need is a routine that emulates the **Wipe* facility, common to the Archimedes ADFS and most BBC/Electron DFS systems. This command – like **Destroy* – works with the files in the *CSD*, but goes a step further, prompting for a Y or N to determine whether each individual file is removed from the catalogue.

Simply type in the program below, and ensure that the object code it generates is saved in the library directory on each of your discs. Then whenever you need to wipe off a selection of files in one go, just enter the directory in which the deletion is required using the **Dir* command, enter **Wipe*, and off it goes.

```
 10 REM *Wipe command for ADFS
 20 REM by Alastair Cadman
 30 REM (c) The Micro User
 40 REM October 1990
 50 MODE 7:osgbpb=&FFD1:osrdch=&FFE0
 60 osasci=&FFE3:oscli=&FFF7
 70 FOR L%=0 TO 2 STEP 2
 80 P%=&900:[OPT L%
 90 .main
100 LDA block+9:STA store
110 LDA block+10:STA store+1
120 LDA #filename MOD 256
130 STA block+1
140 LDA #filename DIV 256
150 STA block+2
160 LDA #1:STA block+5
170 LDA #8
180 LDX #block MOD 256
190 LDY #block DIV 256
200 JSR osgbpb
210 LDA #1:CMP block+5
220 BNE wipe:RTS
230 .wipe
240 LDY #1
250 .loop
260 LDA filename,Y
270 STA delete+7,Y
280 JSR osasci:INY
290 DEC filename:BNE loop
300 LDA #32:JSR osasci
310 LDA #58:JSR osasci
320 LDA #13:STA delete+8,Y
330 JSR osrdch:AND #223
340 CMP #89:BNE donot
350 LDX #delete MOD 256
360 LDY #delete DIV 256
370 JSR oscli
380 LDA store:STA block+9
390 LDA store+1:STA block+10
400 LDA #89
410 JMP finished
420 .donot
430 LDA #78
440 .finished
450 JSR osasci
460 LDA #13:JSR osasci
470 JMP main
480 .store
490 OPT FNequw(0)
500 .block
510 OPT FNequw(0):OPT FNequw(0)
520 OPT FNequw(0):OPT FNequw(0)
530 OPT FNequw(0):OPT FNequw(0)
540 OPT FNequw(0):OPT FNequw(0)
550 .filename
560 OPT FNequs(STRING$(11,CHR$32))
570 .delete
580 OPT FNequs("DELETE"+STRING$(12,
CHR$32))
590 ]:NEXT L%
600 $&700="SAVE Wipe 900 "+STR$~P%
610 X%=0:Y%=7:CALL oscli:END
620 DEF FNequw(S%)
630 !P%=S%:P%=P%+2:=L%
640 DEF FNequs(S$)
650 $P%=S$:P%=P%+LEN(S$):=L%
```

If you have written a routine that may be of interest to other readers, and suitable for publication in this column, do not hesitate in sending it on disc or tape along with documentation to:

Stephen Wade, Routine Matters, The Micro User, Europa House, Adlington Park, Macclesfield SK10 4NP

Don't forget to tell us your name, address and telephone number, and enclose a stamped addressed envelope to guarantee the return of your media. Also provide us with a declaration stating that the routine is all your own work, has not been submitted elsewhere, and that we have your permission to use it.

Understanding temperatures

Author : Peter Shaw
Language : Basic
Filename : TmpConv

WEATHER forecasts are not one of the easiest items to follow at the best of the times, but it's worse if you catch the temperature in Celsius alone when it is only Farenheit you can relate to – or vice-versa.

This program enables you to convert temperatures between the two standards with ease. For simplicity, integer variables are used in the routine, so all answers are rounded off to the nearest degree. You can remove all the % symbols from the variables and use @% to control the number of decimal places used if you require greater accuracy.

```
 10 REM Temperature Converter
 20 REM by Peter Shaw
 30 REM (c) The Micro User
 40 REM October 1990
 50 REPEAT:MODE 7:VDU 23,1,0;0;0;0;
 60 title$="Temperature Converter"
 70 PRINT CHR$(141);SPC(9);title$
 80 PRINT CHR$(141);SPC(9);title$
 90 PRINT CHR$(145);SPC(9);STRING$(
21,",")''':cel$="Celcius":far$="Far
enheit"
100 PRINT "1) ";cel$;" to ";far$
110 PRINT "2) ";far$;" to ";cel$
120 PRINT "3) Exit program"
130 PRINT''''':A=GET
140 IF A=49 PROCcf
150 IF A=50 PROCfc
160 IF A=51 THEN CLS:END
170 UNTIL FALSE
180 DEFPROCcf:PRINT "Temperature in
 degrees ";cel$;" :";:INPUT ""C%
190 F%=C%*1.8+32:PRINT '"That's ";F
%;"degrees ";far$''"Press any key..
.":A=GET:ENDPROC
200 DEFPROCfc:PRINT "Temperature in
 degrees ";far$;" :";:INPUT ""F%
210 C%=(F%-32)/1.8:PRINT '"That's "
;C%;" degrees ";cel$''"Press any ke
y...":A=GET:ENDPROC
```

➤

Safe and secret messages

Author : Oliver Ramsden Language : Basic Filename : Coder

AN ever-popular area of computing is that of protection. This program concentrates on the theme of coding messages which are to be passed to fellow BBC/Electron users – although the techniques could be extended to program protection.

BBC Basic claims to have an in-built random number generator, but the sequences it produces are actually predictable and thus only pseudo-random. This is because micros cannot think for themselves, but instead make a sequence of seemingly random numbers using a complex algorithm. However, we can use this situation to our advantage.

Using a *seed* number, it is possible to generate a repeatable sequence of values which can be used to code a message for us by way of the Exclusive-OR function.

The program below does just this. First of all it asks you to input a code (seed) number – which can be anything from 0 to 2147483647 – followed by the message to be encoded. This can be whatever you like, so long as it does not exceed 256 characters. Finally, the filename to save the coded message under is requested. To decode a message, the code number is again requested – make sure you use the same one as you did when coding it – along with the filename of the coded file.

At this point the message is loaded into memory and decoded, and you are asked whether you would like a printout. If you do, simply tap the Y key.

Your coded text is quite safe, as there are more than 21 billion possible seed numbers, and anyone attempting to decode files containing encoded messages directly faces testing a number of combinations which can be anything up to 256 to the power of the number of characters within them.

Although the program is designed to work with single string messages of up to 256 characters, it could easily be modified to allow longer documents to be coded. This could be done by using BPUT# and BGET# instead of PRINT# and INPUT#, and a "hand-made" character input routine instead of the INPUT command.

```
 10 REM Message encoder/decoder
 20 REM by Oliver Ramsden
 30 REM (c) The Micro User
 40 REM October 1990
 50 ON ERROR CLS:VDU 7:PRINT "ERROR!"'
:REPORT:PRINT" at line ";ERL''"Error num
ber ";ERR'':PROCos("CLOSE"):END
 60 REPEAT:MODE 7:PRINT "MESSAGE ENCOD
ER/DECODER"'STRING$(23,"=")''''"1) Encod
e message"''"2) Decode message"''"3) End
rogram":REPEAT:A$=GET$:UNTIL INSTR("12
3",A$):IF A$="1" PROCencode ELSE IF A$="
2" PROCdecode
 70 UNTIL A$="3":CLS:END
 80 DEFPROCencode:CLS:PRINT "MESSAGE E
NCODER"'STRING$(15,"="):REPEAT:INPUT ''"
Code number : "code%:UNTIL code%<>0:REPE
AT:INPUT ''"Message to be encoded : "''m
essage$:UNTIL message$<>"":coded$="":rnd
=RND(-code%)
 90 FOR number=1 TO LEN message$:thiso
ne=ASC(MID$(message$,number,1)):rnd=RND(
256)-1:thisone=thisone EOR rnd:coded$=co
ded$+CHR$(thisone):NEXT
100 REPEAT:INPUT ''"Filename to save t
he coded message under: "file$:UNTIL fil
e$<>"":F%=OPENOUT file$:PRINT #F%,coded$
:PROCos("CLOSE"):PRINT ''"Done."'"Press
any key to continue...":A$=GET$:ENDPROC
110 DEFPROCdecode:CLS:PRINT "MESSAGE D
ECODER"'STRING$(15,"="):REPEAT:INPUT ''"
Code number : "code%:UNTIL code%<>0
120 REPEAT:INPUT ''"Name of file conta
ining the message to  be decoded : "file
$:UNTIL file$<>"":message$="":rnd=RND(-c
ode%):F%=OPENUP file$:INPUT #F%,coded$:P
ROCos("CLOSE")
130 FOR number=1 TO LEN coded$:thisone
=ASC(MID$(coded$,number,1)):rnd=RND(256)
-1:thisone=thisone EOR rnd:message$=mess
age$+CHR$(thisone):NEXT
140 PRINT''"Shall I send the decoded m
essage to the printer? (Y/N)":REPEAT:A$=
GET$:UNTIL INSTR("YyNn",A$):IF A$="Y" OR
$="y" THEN VDU 2
150 PRINT 'STRING$(40,"=")'"The decode
d message is :-"''message$''STRING$(40,"
="):VDU 3:PRINT "Press any key to contin
ue...":A$=GET$:ENDPROC
160 DEFPROCos($&700):LOCAL X%,Y%:X%=0:
Y%=7:CALL &FFF7:ENDPROC
```

Patch for a printer

Author : Chris Lawlor
Language : 6502 code
Filename : Amercn

WHEN making hard copy of long assembler listings using your printer, don't you find it annoying when you discover that all the hash symbols have come out as pound signs?

If you do, then this short program is all you need to fix it. It simply assembles a short piece of machine code which is automatically saved under the filename of *Amercn*.

When executed – using **Amercn* – the code switches on the printer using VDU 2, sends a control sequence to select the American character set – which contains the hash in the correct place – using VDU 1,27,1,82,1,0 and then switches the printer off using VDU 3.

The program will only work with printers known as Epson-compatibles because each different kind of printer supports a different set of control codes.

However, if your printer is not Epson-compatible but you know the code which is used to select the American character set, simply substitute it in lines 90 to 140.

```
 10 REM Select American Character Set
 20 REM * Epson compatibles only *
 30 REM by Chris Lawlor
 40 REM (c) The Micro User
 50 REM October 1990
 60 MODE7:oswrch=&FFEE
 70 P%=&C00:[OPT 3
 80 LDA #2:JSR oswrch
 90 LDA #1:JSR oswrch
100 LDA #27:JSR oswrch
110 LDA #1:JSR oswrch
120 LDA #82:JSR oswrch
130 LDA #1:JSR oswrch
140 LDA #0:JSR oswrch
150 LDA #3:JSR oswrch:RTS:]
160 $&700="SAVE Amercn C00 "+STR$~P%
170 X%=0:Y%=7:CALL &FFF7:END
```

Shapely Turtles

Author : Michael Jones
Language : Logo

This short program, written in the Logo turtle graphics language – used in schools under the national curriculum – demonstrates how easy it is to generate regular shapes on your screen.

A polygon is drawn when you call the routine using:

```
POLYGON :SIDE :NUMOFSIDES
```

where :SIDE signifies the length of each side in your shape, and :NUMOFSIDES corresponds to the total number of sides that your polygon contains. For example, a triangle could be drawn using:

```
POLYGON 100 3
```

and a square using:

```
POLYGON 100 4
```

As circles are many sided polygons, they can also be drawn using the routine. A fairly reasonable one can be drawn using

```
POLYGON 10 36
```

So there you have it! An easy to use, yet invaluable routine to add to your library of Logo techniques

```
TO POLYGON :SIDE :NUMOFSIDES
MAKE "ANGLE 360 / :NUMOFSIDES
REPEAT :NUMOFSIDES [
FORWARD :SIDE
LEFT :ANGLE ]
END
```

Monthly cassette and disc

All of this month's routines can be found on the monthly subscription disc and cassette. On the 5.25" disc the programs reside in the "R" directory, and on the 3.5" disc in the "RoutMats" directory.

Those routines designed to work on the Archimedes series and A3000 micros are already file-typed on the 3.5" disc for your benefit – they are the ones without a blank icon when viewed at in the desktop environment.

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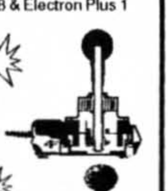

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PROBLEM Solved

Your technical questions answered by MIKE COOK

Topics on the agenda...

- Adding a hard drive
- SCSI – the truth
- Getting Body Building back issues
- Printing from a Master 128
- Improving poor keyboard response
- Running multiple roms
- No language messages
- Quest for speech compatibility
- Taking the biscuit tin

Rom roundup

I HAVE a Rom Box which plugs into the *ashtray* on my Model B. One of the many roms we have in the box is Wordwise and to get it working we have to turn a knob until the LED next to it lights up then type the necessary command.

I've tried to use Spell-Master at the same time – initialising that first then going into Wordwise. But when I press Control+f8 – which is supposed to display the dictionary – it just goes berserk and I have to press Control+Break to stop it.

Could it have anything to do with turning the knob on the rom box and that only one rom can be accessed at a time?

I've tried everything I can think of but I can't make it work. – **Jered Bolton, Norwich.**

● *Yes, you're right, it won't work because the way the rom box operates you can only have one rom active in it at one time.*

You should never change the current rom while the computer is switched on othewise it will become confused. You see, whenever you turn your micro on, or perform a Control+Break, the machine operating system asks each rom it sees to initialise itself.

By changing the active rom which has been initialised to one that hasn't your micro gets mixed up. The only solution is to put Wordwise into a spare rom socket inside the machine itself, or replace your rom box with a rom board.

Inter-connection

I AM about to fit my BBC A3000 with a SCSI card and 20Mb hard disc. I decided on this type because I understand that a SCSI disc drive is faster than the Acorn-specific ones.

Also I've heard that SCSI provides much more expansion capabilities in the form of CD Roms and other devices, is this true? – **S. Morris, Portland, Dorset.**

● *The SCSI (Small Computer Systems Interface, pronounced scuzzy) will certainly allow you to connect a large number of external devices to your micro.*

However, physically connecting up the hardware is only part of the problem – you need the software to drive whatever it is you're hoping to use, which is best located in rom on the SCSI board itself.

If you're buying the SCSI board and hard drive together this won't be a problem – but you won't have the software that will enable you to read a CD-rom.

One definite advantage of buying the SCSI card and hard disc driver is that – with the correct software – you'll be able to use any SCSI hard drive and even chain them together.

Old body builders

I HAVE recently started to take *The Micro User* and would like to know if there is a compilation of all the previous Body Building articles? – **P. J. Elsey, Eltham, London.**

● *Unfortunately it's not possible to get all the back issues of* The Micro User *– except perhaps through the Classified ads, and it's simply not cost-effective for Musbury Consultants to photocopy the entire set – after all there's been 90 issues of the magazine and Body Building occupies three pages on average.*

However, if there's sufficient demand the situation may change...

More memory power

I OWN an Archimedes 410/1 to which I recently added a 5.25in Opus 40/80 using a Watford Electronics External Drive Interface Mk II. The system works well but defaults to drive one – the external drive. Is there any way I can configure the machine to start up with drive zero?

Also I have been given a Seagate hard drive ST-125-1 (N2SKAGPB08Z) which I would like to fit to my machine. It has come without a casing and can be removed from its frame.

Unfortunately I wasn't given the wiring details but there is a label which gives the input voltage/amps ratio, which is +5v/1.2amps and +12v/2.0amps.

I'm a mechanical engineer by trade and although my electronics experience is practically nil I've got reasonable electrical knowledge and know how to wield a soldering iron. I'd be grateful if you could advise me of the viability of this project and any help you can provide. – **D. E. Hoole, Bristol.**

● *You can use:*

```
*CONFIGURE DRIVE 0
```

to ensure the default drive is the internal one – which is different to the:

```
*CONFIGURE FLOPPIES 2
```

command which you used to tell the machine that you have two drives.

As the A410/1 has a hard disc interface fitted as standard it should be possible to use your new drive. But it looks as though

➤

Biscuit tin communications

In an earlier Micro User I vaguely remember you describing a method of communication using a buried metal biscuit tin as a transmitter and receiver, you did not though elaborate on any interfacing needed to the computer or any software. I have a good knowledge of assembler and various parts on the BBC so software would not be an immediate problem.

I am very interested to know of this method of communication and may even follow it up as an A level technology project. – **Stephen Youell, Wrestlingworth, Bedfordshire.**

● *This is basically done by using a power audio amplifier feeding into two earths on the recieving side into the input of an audio amplifier. There is a lot of mains hum and you don't get very far. In order to make it compatible with a computer you are best using a modem at each end and some standard comms software. However the range will be even less using this method as you need a good strong audio signal to get a modem to work.*

From what I could remember of some reported results of this technique in Practical Wireless (I think in about 1964 but I'm not sure it's a long time ago) the limit of operation was about 1 mile using 25 watts of audio. For maximum range you would require impedance matching of input and output to the earths impedance. It would make a very interesting A level project.

➤

it has quite a high current requirement and would probably be best with a separate power supply.

Your best bet is to find a good dealer and see what he can do with it.

No way out

FIRST a quicky: How do I get colour from the BNC socket on the Master? I have seen the solution published, but I just can't find it.

More importantly, I can't get any output from my printer port. I've checked the printer and cable but they seem to be OK. I've tried all sorts of ways of producing the output using VDU2 and Contrl+B – are there any tests I can perform to determine where the fault lies? The rest of the machine works fine. – **Andrew Haigh, Barnsley.**

● *The Master normally can't produce a composite video output however there is a simple modification that you or your dealer can do.*

Simply connect a 470pF capacitor between the left of R137 and the left of R153 – these are to the left of the modulator. You can solder the capacitor directly to the component side and there's no need to take the board out.

If you are at all unsure about this ask your dealer to do it.

There's no way that a program alone can test the printer port as all it can do is send data out – but it doesn't know if it gets out.

*However, there may be a very simple solution to your problem. You don't say whether you've ever managed to print or if this is a new phenomenon, anyway try *FX5,1 before trying to print. This selects the parallel printer port for output. If it now works, you can set it permanently with:*

```
*CONFIGURE PRINT 1
```

The FX5 command can also be set to zero, which sends all output to a printer sink which simply absorbs it without doing anything. Or it can be set to FX5,2 which is the serial output port.

If this doesn't work there is probably a fault with the hardware. If a printer fails to respond it is most likely that there is some sort of error in the strobe, or busy signals either in the printer or the micro. Don't be fooled by the printer's self-test, as this doesn't check the interface.

You really need to be able to use an oscilloscope to see if the micro is generating the correct strobe and the printer is producing the right busy signal.

Keyboard capers

I HAVE a BBC Model A upgraded to a B with Inter-Word and printer on which I do a lot of word processing. I'm finding that the keyboard response is very poor and the feel of the keys is very inferior to the machine I use at work – the spacebar in particular is very hit-and-miss.

Is it possible to connect a higher quality keyboard – preferably free-standing? Are most keyboards compatible?

I can cope with any wiring modifications, but a simple plug-in would be better. Any suggestions other than buying a new machine? – **Phil Hughes, Theydon Bois, Essex.**

● *A replacement keyboard is not a practicle idea – unless it comes from another Model B – as there is no standard for wiring them up. Your best bet – particularly as you'd like a free-standing unit – is to get a keyboard that provides serial Ascii output and plug this into the RS423 serial port of your micro.*

You can then use *FX7 to set the correct baud rate, followed by *FX2,1 which will switch to the new keyboard. To switch back just type *FX2,0.

A suitable unit is sold by Farnell (0532 636311) order code 176-699 priced at £64.69, which is cheaper than a new machine.

Talking micros

THIS morning I was trying get an apparently damaged Viewsheet rom working on my brother's BBC B – but on Control+Break the machine froze after putting up the Viewsheet message.

To check that the socket was OK I swapped it with the Watford Electronics Speech Synthesiser Support rom. But now when I pressed Control+Break I got this:

```
BBC Computer 32K
Watford Electronics DDFS 1.52
SPEECH SUPPORT SOFTWARE (MP83)
THIS AIN'T A LANGUAGE, SILLY!
OScom->
```

This surprised me and wondered if it was the BBC Micro or the rom, so I tried it on my Master and just got:

```
Acorn MOS
Acorn DFS
This is not a language
*
```

What has happened?

I'd also like to know whether it is possible to connect both the Quest Mouse and the Watford Speech Synthesiser to the user port simultaneously – one for input and the other for output. – **Alexander Seeley, London.**

● *Error messages are usually looked after by the operating system – unless intercepted by a rom. However it's a little different in this case.*

Although the speech synthesiser rom is not a language it clearly has an appropriate entry point.

The Model B is obviously using this entry anyway and the synthesiser gives the slightly humourous message and then provides you with access to the command line – a very simple procedure that occupies just a few bytes.

On the other hand the Master is more sophisticated, and having observed that the rom is not a language – using a special code byte – reports the fact and enters its own command line interface.

The user port can act as an input or output, but not both at the same time so you can't connect both at once.

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '✱' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

QUESTIONS & ANSWERS

Q – What is the difference between the 12 bit and 16 bit version?

A – The 12 bit version can produce very high quality pictures, those shown on this page were produced that way, but 16 bits can give even better results particularly in high resolution screen modes.

Q – Why have an R, G, B input?

A – For those who have professional video cameras capable of producing R, G, B outputs, the R, G, B inputs can give significantly better results than the PAL inputs by avoiding the coding-decoding process. This removes some of the defects of the PAL system such as cross-colour, and also reduces noise.

Q – Is a moving picture available?

A – Yes, you can show a real live moving TV picture on the computer screen. This means that if you are using a video camera or recorder as an input source then you don't need a separate monitor to frame up the picture.

Q –Will it work on the A3000?

A – Yes, but you need an inexpensive adapter box which we can now supply.

Q –Are the controls difficult to set up?

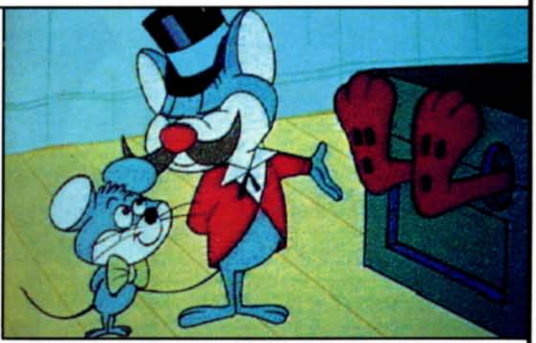
A –No, the three controls are exactly the same as on a normal TV set, Brightness, Contrast and Colour (Saturation). They may appear difficult to get at as they are at the back of the computer, but once set to your preference the brightness and colour should not require further adjustment, and the contrast (which is the easiest to get at) will only need adjusting if the video input source is changed.

Q –Does it take a long time to Digitise a full screen colour image?

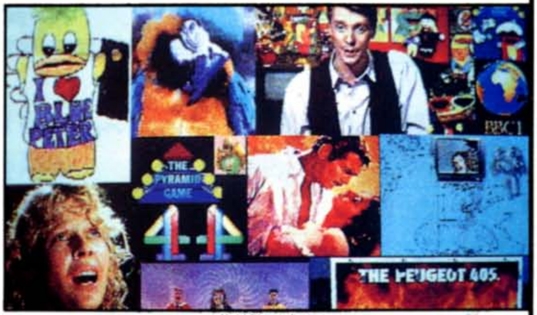
A –Not really, a full screen image takes just 6 seconds on a standard 310, and reduced size images take proportionately shorter times.

Q –What software commands are built into the module?

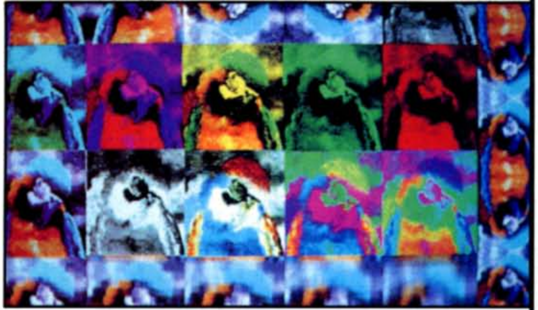
A –The software is under continual development and updates will be made available under our usual updating schemes (i.e) most updates are free), but the currently available commands are :– Average, Bits, Default, Digitise, Flip, Focus, Freeze, Image, Loadscreen, Loadsprite, Loadvideo, Mono, Moving, Negative, Noise, Outline, Palette, Primary, Restorescreen, SaveAIM, Savescreen, Savesprite, Savevideo, Screenarea, Setvideo, Unfreeze, Videoarea.



Cartoon



A Multi Picture Image



Some Digitiser Effects

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

–'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes'–

Acorn User – April 90

Prices:

Standard	**£285**
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A3000 Adapter Box	**£65**

POSTAGE AND PACKING FREE

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This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price.'

ACORN USER Aug 88

PRICE	Manual track routing	£85.00
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Still available at new discounted price!
DIAGRAM II £25.00 !!!

ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new ✱ commands to the ADFS filing system as well as providing an extensive menu facility with over 35 sub commands covering such areas as repearted disc compaction, saving and loading Rom images, auto booting of files, and many more. Transferring of files from DFS to ADFS is also made very easy.

ADU ....£29.00 P&P free

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Access

Mad Hatter manages to avoid ending up in the clink

The final pay-off

LAST month we spent considerable effort in erasing all traces of our presence down in the sewers and on the roof of the bank. Now it is time to bring *Dodgy Geezers* to a successful conclusion.

After you have closed that last grating go N and W so that you enter the walk-in cupboard – what would adventures do without them? *Take trolley* is the required input here, and then return E and S. Now you should *Examine vault* and *Wait* for a few moments of cogitation.

This will cause Mr. Video to offer his services, so *Say yes* and let him exercise his skills. Now you will be able to *Enter vault* where you will find some wooden crates. *Examine crates* and *Open crates* will reveal the gold bars that you have laboured for so long.

It is a moment for acute self-control since what you must enter here is *Close crates*. The gang will then have a case conference and finally ask you if the gold should now be loaded. Continue in self-control mode and *Say No* since Soapy has given you a brainwave, and instead *Say collect nails*.

Soapy will now go off and find Tricks so that they can bring the crates of nails. The gang will load the gold into the van, leaving the crates of nails in the bank vault. Neat, eh?

Take trolley, *Leave vault* and *Close vault* are the instructions you now need. After that, go N and W, *Drop trolley* and then continue E, S, E and E to the foyer.

Tricks will announce that the coast is clear so you can go E to Terminal Street, where the gang is waiting and the van is now loaded with the stolen gold. *Get in* and Tricks will ask where to drive, so *Say docks*.

While Tricks is ferrying you and the gold to the docks, you all have a jolly discussion as to what you will do with the luscious loot. On arrival you should *Get out* and unload the crates of gold, stowing them aboard the yacht.

Board yacht and *Read newspaper* and you'll discover not only that the police are puzzled, but also that the bank manager has been murdered and an Italian restaurant has unexpectedly closed. You can then sail off to sunny Terrormolinos, congratulate yourself for being a clever dick and live happily ever after upon your illgotten gains.

Final note: If you haven't tidied up meticulously, leaving no trace whatever of your movements, you'll fail to make a clean getaway. You have been warned.

Exeats and entrances

As I recollect, it was Will the Bard who reckoned that all the world's a stage and so on. While we may not be about to tread the Bard's boards exactly, we shall certainly finish this session in **Oxbridge** with a valuable manuscript – even if not a First Folio.

As usual, our starting place is the trophy room and – as a memo for newcomers to the adventuring genre – it is always worthwhile finding a fixed (and more or less central) location from which all serious forays into the game begin. The dumping place for treasure, as here, is a typical example. Before doing anything else, take the pole – it will prove useful for one last time.

From the trophy room move E, N, N, N, N, SAY EXEAT to leave college safely and continue N, N, W, E, E, E, N, W, S and take the vase. That deals with the easy bit of the museum.

The pole's purpose is to thwart the antitheft device securing the statue's safety. So carry on N, N, and W to the statue. If you

Hatter's Helpline Hatter's Hel

I've had quite a long letter from Anthony Gordon offering help to a couple of readers stuck in different adventures.

Adventure: Water can be obtained from either of two sources – the lake or the pool. What you need is a container, so take the wine and drink, this action providing an empty bottle.

His other piece of advice for this game concerns the dungeon: Make sure you have the keys before being thrown into it and then the standard entries of *Unlock door* and *Out* get you into the guardroom.

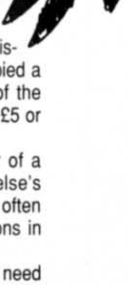
The solution in **Five Spheres of Goliath** is, it would seem, blindingly simple: When you take the spheres to the console it is just a matter of inserting each colour in turn.

Anthony raises a matter that is common to a number of readers, and which appears in just about every postbag I receive. He'd like the complete solution to an adventure – in this case **Dungeon Adventure.**

Anthony is no cheapskate and realises that costs involved – but in fact they are even higher than he realises, and by the time one has photocopied a solution and added postage, some of the high quality games would work out at £5 or so.

There is also the delicate matter of a particular solution being someone else's work. Readers and software houses often give me permission to publish solutions in the column – and that's fine.

I am, however, acutely aware that I need to protect the interests of software houses for one simple reason: If I kill the market by either publishing solutions too soon, or



were simply to take it here – as no doubt some of you have discovered – fatality follows on account of the fact that the pesky statue is on a weighbridge which records its removal.

Intelligent adventurer that you are – flattery , hopefully, will get me everywhere – you have worked out that a punt pole weighs precisely enough to compensate for the statue's removal, so you drop the pole, grab the statue and scarper. The alarm is now safely silenced.

However, all is not quite plain sailing – or stealing, anyway – since a ticket troll is on the prowl and must be avoided at all costs. Exeats via the fire exit are thus the order of the day, and to achieve this you must go E, E, E, E, and PUSH DOOR to leave the museum safely.

It's time you earned a medal, and if you make one more move E you'll find a leaflet while you are just outside the Sirdar Restaurant. Since you are an anti-litter type, and a sensible adventurer to boot, you pick it up and continue SE, S, W, N, E, E and E into the Wimpy Bar. If you haven't done so already, do read the leaflet and then *Throw leaflet* into the litter bin. Go W and W and claim your reward of the SuperWimp Medal – something you have always wanted.

Bursting with pride you should now continue W, S, S, S, E, E, N, N and S to where the passport awaits you: Fantastic travels beckon – but not yet. Continue N, E, W, S, N, E, N, E, W, S and N to the manuscript.

The maze here has an interesting facet – the rooms in the library may look the same superficially, but in fact each is uniquely identified by its book colour and lettering – and this is the mapping clue.

Fiendish fellow that Colin Jack is, he comments in his notes: *Higher letters are more difficult to locate, the manuscript is in a room with empty shelves beyond the Z room.* Colin adds that the manuscript can be read.

Having grabbed the manuscript you should now go N, N, S, N followed by 12 moves South – count carefully – before moving West into the trophy room. Dropping the vase, medal, manuscript and statue and checking your score should prove that you have earned 45 points. The next bit is even worse and Colin has taken the trouble to highlight some of the moves in yellow.

(Continued next month)

ne Hatter's Helpline Hatter's Helpline Hatter Helpline

inadvertantly aid and abet a rip-off in some way, then all too quickly there'd be no adventures – and we would all suffer.

Back to Anthony and **Dungeon Adventure:** I did, in fact, serialise the solution in the issues from September 1988 to February 1989. It would be worth checking the Classified ads to see if a reader has offered old copies of *The Micro User* for sale.

Finally, Anthony wonders if I am likely to serialise solutions to either of two educational adventures from Topologika – **The Myth of Moby** and **Giantkiller**.

It is certainly my policy to feature educational adventures from time to time, and while I have bought **Giantkiller** I don't possess **Moby**. However, there are one or two others which are further up the queue and so the sensible answer is to say you are unlikely to see **Giantkiller** serialised in the near future.

Russell Lamb is, like me, a Magnetic Scrolls fan. He was pleased to see the tips I passed on for **Corruption** but – again like me – he has problems with the car: He tells me that if you try to drive it after 2 o'clock you get blown up by a bomb.

He is stuck in another great adventure, **Jinxter**, and wonders how to separate the oil from the water in the plastic bottle. Well, Russell, oil freezes at a much lower temperature than water.

Enough said?

Tony Marter is back with help for David Shepherdson in **Castle Dracula.** The suit of armour can be awakened by offering it the can (of STP) located in the secret passage behind the Quasimodo. The tin opener will then scare it away. Quasimodo can be persuaded to move via an offer of whisky: Use the bottle in the maid's room as a container.

Tony warns against scaring the armour too quickly as it is needed to frighten the Zombie once you have built and used the ladder.

Final point from Tony: He reckons the rubble on the staircase is just decoration. However, you'll need the plank, axe and nails as ingredients for the ladder – once you have used the plank to cross the abyss.

ELITE UPDATE

Rowan Hackett – one of the very few girls who have written to me about **Elite** – encountered our Cloak and Dagger mystery ship in Galaxy 2 while she was on the First Mission.

Her description of how she tackled things is worth passing on, because it will help those of you who haven't encountered it yet to recognise the warning signs:

Shortly after achieving Dangerous status while bounty hunting, my space jump jammed, although no ship appeared on the scanner. I checked my status and found that it was Yellow.

After circling about a bit I saw a small dot on the screen. I accelerated to full speed but the dot failed to get larger. I took a chance and opened fire.

Rowan goes on to describe the combat, but the important point she makes is this: If you can't jump and the scanner is clear, check your status screen. If it is at Yellow you can be sure the Cloak and Dagger ship is nearby.

Graeme Moignard is another Dangerous criminal who has encountered it – in Galaxy 4 – on his Master version. I think we can therefore conclude that its appearance is quite random.

Graeme has a query: Does the Elite cheat on the Superior collection **Cheat it Again Joe** work? I'm sure it does or they would not be marketing it, though I somehow missed its arrival.

Bill Schwalbe, owner of an old tape version, wonders if anyone has managed to visit Soiscear in Galaxy One, and reminds us that scooped up Thargons become Alien Items which are best sold at a Poor Agricultural system.

Password Passé

Hac Man hands out helpful hints by the wagonload

THIS month I'm offering another mixed bag of goodies to appeal to all game players from the hardened shoot-'em-up fan to the avid arcade-adventurer, so without further ado, on with the show.

I recently came across a couple of letters from Jonathan Bullock of Coseley, West Midlands and A. Cutts of Gurnard, Isle of Wight, both of whom have the same query regarding the finish of **Palace of Magic**.

They both say that when they complete it – on the Play It Again Sam 3 version of PoM – they were given a password, but do not know what to do with it. Can I offer any advice?

In fact the password was designed as a method of entering the competition associated with the original release.

Play It Again Sam 3 also featured a competition which asked you to answer four questions – one for each game. The question for Palace of Magic was *What is the mystery codeword when you complete the game?*.

Both competitions, alas, have long since ended.

Next month I will be featuring, among other goodies, a solution to Level 2 of Superior's classic Ravenskull. Be there or be a blue ghost.

Power pills

- **Palace of Magic competition password**
- **Space Hi-way or Dune Rider?**
- **Citadel barrel explored**
- **Psycastria 2 cheat mode**
- **Sphere of Destiny 2 cheat mode**
- **!Nevryon passwords and hints**
- **Perplexity passwords**
- **Labyrinth cheats and other goodies**

Roll out the barrel

I featured a number of hints for **Citadel**, including how to get the three crowns, in the May 1990 issue. I also mentioned that I had never found a use for the barrel located in the central castle at spot -1,0 immediately to the left of your start position.

Since then I have received letters from a number of readers including Stephen Jones of Reading, Nathaniel Blundell of Malvern Link, Worcs and Morten Kamp of Copenhagen, Denmark.

They say they have used the barrel in two different places, but always to achieve the same effect. Morten and Stephen used it instead of one of the trampolines to reach the hidden room to the left of the cellar that contains the green and yellow crown. Nathaniel, on the other hand, has used it to enable him to jump on to the roof of the witch's house.

I must admit I'd always used a trampoline to make both of these jumps – maybe I'm just lazy – but in response to these letters I have tried using the barrel in both of these locations and it works just as well, although the jump from the cellar is very tricky.

Thank you, one and all.

Is you is or is you ain't Dune Rider?

In our October 1989 issue I replied to a query from Kevin Jones of Leeds, who wanted to know if **Space Hi-Way**, the Mat Newman game before Fortress, ws still available.

I responded in the negative, but I have since received a letter from Matthew Knight of Atherstone, Warwickshire, who says that my description of Space Hi-Way exactly fitted a Micro-Power game called Dune Rider by Ashley Saulsbury.

In fact, Space Hi-Way and Dune Rider have almost no similarities, so – in response to the heading query – Space Hi-Way *ain't*, but I was intrigued that these two games should be grouped together because both programmers are old grammar school colleagues of mine.

It's a small world.

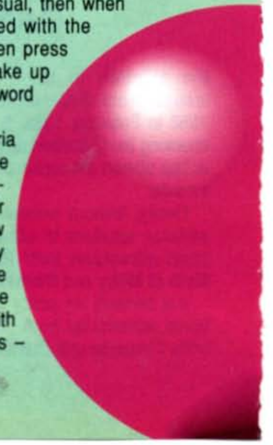
The Speed King returns

Seasoned game players will know that all but the very early Gary Partis games feature cheat modes, so I was not at all surprised to receive a letter from Phillip Rogers of Plaistow, London, which gave details of cheat modes for the two Partis games on Audiogenic's Fab Four compilation.

To obtain infinite lives on **Psycastria 2**, first enter *FX231,1 although this is unnecessary if your machine is fitted with the Micro Power Dr Who rom. Type *RUN PSY and when the game has loaded press keys I, L, T, D and N simultaneously. When you are asked for a password enter PORSCHE and start – the Psycastrians won't know what's hit them.

In **Sphere of Destiny 2** load from the main menu as usual, then when you are presented with the main game screen press the keys that make up the letters of the word JUMP.

As with Psycastria 2, you will be asked for a password. Enter PORSCHE. Now when you play you'll find that the black holes have been replaced with white bonus tiles –



Another way out

Acornsoft's classic maze game **Labyrinth** has been claiming quite a few column inches recently and now is no exception. In the June 1990 issue I provided an infinite lives poke for the 5.25in disc version of Labyrinth as featured on the Acornsoft Hits Volume II.

I also mentioned that I did not own copies of any of the original Acornsoft versions so that if any owners of those versions wanted help, they should send me their games with an sae and I would see what I could do.

John McElroy of Plaistow, London has taken me at my word and sent me his copy of the original Acornsoft 5.25in disc. I do not know if there was more than one Acornsoft disc version of Labyrinth, but John's claims to be "...BBC Version 1...".

To check the version number type:

```
LOAD"LAB"
LIST
```

and a screen similar to the following will be displayed:

```
 10REM ...Labyrinth...
 20
 30REM ...BBC Version 1...
 40
 50REM Copyright (C)
 51REM Acornsoft Limited 1984
 60
 70IF INKEY-256<>0 AND INKEY-256<>-
1 THEN PRINT''''"This program is on
ly suitable for a BBC Microcomputer
":END
 80IF INKEY-256 A%=&EA:X%=0:Y%=&FF:
IFUSR(&FFF4) AND&FF00 THEN PRINT'''
'"Please turn your TUBE off, and st
art again":END
 90IF?&FE64=?&FE64 PRINT''''"IC 69
missing / faulty   Please see your
Dealer":END
100*RUN Lab1
```

Master owners will have found that they they get the message "This program is only suitable for a BBC Microcomputer" when they try to boot the disc. This is because the program is testing to see if the computer is fitted with a series 0 (provisional) or series 1 operating system, and rejecting anything that reports something different. However, this problem is easily cured. Simply type:

```
GOTO 80
```

to play. Now on to the pokes. In addition to the infinite lives ones for other versions of Labyrinth featured in previous columns, this routine offers an option of extra lives, up to a maximum of 128. Because Labyrinth's lives count is actually the number in reserve rather than the actual number of lives, a crack explorer needing a challenge could set the value of *L%* in line 70 to zero, so that the only life on offer was the one with which you start.

Also incorporated in this routine is something I have featured quite a lot recently. It allows you to set up a personalised high-score table that will be displayed automatically.

Finally, I have provided an option that may be popular with game players too lazy to learn a new set of keys, or at least a new fire key.

Many games are controlled using the Z, X, : and / keys to move the central character around the screen, with firing controlled by the Return key.

However, Labyrinth differs slightly in that the fire key is] – between : and Return on the keyboard. For the ultimate lazy player, line 150 redefines the fire key to be Return – simply delete this line before running the program if you are happy with the predefined keys.

As is usual with routines featured in this column, enter the following listing exactly as shown, save it on to one of your own blank discs, then type RUN and follow the on-screen instructions.

```
 10 REM Labyrinth infinite/extra li
ves,
 20 REM hi-score table editor and n
ew fire key
 30 REM for Acornsoft "...BBC Versi
on 1..." disc version
 40 REM by Hac-Man 1990
 50 REM (C) The Micro User
 60 REM
 70 L%=2:REM number of lives in res
erve (0-128)
 80 FOR I%=0 TO 2 STEP 2:P%=&120:[O
PT I%
 90 .lives PHA : LDA# L% : STA &BC2
 : PLA : RTS
100 ]:P%=&900:[OPT I%
110 LDA# &AD : STA &3723 :\ infinit
e lives
120 LDA# &20 : STA &36B9
130 LDA# lives MOD 256 : STA &36BA
140 LDA# lives DIV 256 : STA &36BB
150 LDA# &C9 : STA &5D68 :\ Return
key to fire
160 LDX# &B8 : .loop LDA data,X : S
TA &5B09,X
170 DEX : CPX# &FF : BNE loop
180 JMP &5D00
190 .data
200 ]:NEXT
210 CLEAR:DIM N$(8),S(8)
220 S(1)=&003751:N$(1)="Hac-Man's a
ttempt!!"
230 S(2)=&080100:N$(2)="Superior/Ac
ornsoft."
240 S(3)=&000100:N$(3)="Superior/Ac
ornsoft."
250 S(4)=&000100:N$(4)="Superior/Ac
ornsoft."
260 S(5)=&000100:N$(5)="Superior/Ac
ornsoft."
270 S(6)=&000100:N$(6)="Superior/Ac
ornsoft."
280 S(7)=&000100:N$(7)="Superior/Ac
ornsoft."
290 S(8)=&000100:N$(8)="Superior/Ac
ornsoft."
300 PROCtable:*FX 15,0
310 MODE 7:PRINT "Please insert Lab
yrinth disc and press any key...";
320 G%=GET:PRINT
330 *LOAD LAB1
340 *LOAD LAB1 2E00
350 !&2E12=&F02E04EE:!&2E16=&2E04AD
0A
360 !&2E1A=&F1F01EC9:!&2E1E=&602E00
4C
370 CALL &2E00
380 ?&2FF5=8:CALL &2F72
390 END
400 DEFPROCtable
410 data=P%:FOR X=1 TO 8
420 N=(X-1)*23+(data+3):$N=LEFT$(N$
(X),19)
430 S1=S(X) DIV &10000:S2=S(X) DIV
&100 MOD &100:S3=S(X) MOD &100
440 H=N-3:?H=S3:?(H+1)=S2:?(H+2)=S1
450 NEXT
460 ENDPROC .
```

an effect identical to the LAZONNOMORE cheat mode in the original Sphere of Destiny.

At the time I revealed the original cheat facility I said that it made the game rather too easy, so I am rather surprised to see that this feature has been retained for the sequel. To my mind infinite lives would have been a better cheat, because you would still have to learn how to play in order to get anywhere. But even so, it's still a fun game.

Just wanna kill

Robert and Ben Davis of Caterham, Surrey have sent me the passwords for the 8 bit version of **Nevryon**, 4th Dimension's great shoot-'em-up:

Level 1	No password	Level 5	STEREO
Level 3	ARCHIE	Level 7	REBEL

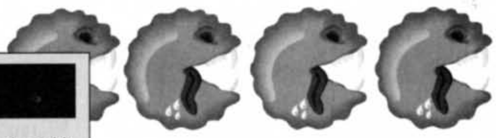
I have also received a number of hints from Scott Swinton of St. Albans, Herts, which I am sure will be invaluable to many Nevryon players, even with the passwords.

Avoid the fire-breathing dragon statues as they can splash you with sheets of flame from quite great distances.

Only try to collect extra weapons if they are easy to get: Many lives are lost trying to pick up extra weapons in awkward places.

- Use the ship's forward and backward movement to avoid the many obstacles that get in the way.
- Don't go through the *energy barriers*. Instead, blast off the top or bottom and fly over or under them as this saves energy.
- Keep a safe distance from the enemy. If you get too close you may get caught up in a circular formation of aliens from which it is almost impossible to break out without a loss of energy.
- Keep moving. If you stay in one place for too long the enemy get wise and start firing at you with great accuracy.
- The gundroid is a useful assistant. But don't let it wander too far away, because you'll need it near for the end-of-level alien.
- Make a map of each level and mark the trickiest sections. This is very useful, especially on later levels.
- Beware of the small circular bombs. They are very accurate and must be avoided at all costs.
- When you are confronted by the end-of-level alien you can destroy it in sections.

Thank you Scott.



Less Perplexing

Perplexity from Superior has been described as a cross between Pacmania and Repton, and it certainly has a number of the addictive qualities of both. Now we present the full set of passwords, courtesy of Daniel Davighi of Moulton, Northants.

Level	Password
1	START
2	CROUPIER
3	DECEIVE
4	CONTEND
5	LACERATE
6	VANGUARD
7	BUSINESS
8	REASON
9	OSMIUM
10	DUBIOUS
11	STUBBORN
12	XYLOCARP
13	STIMULUS
14	WARDROBE
15	SPARKLE
16	VOLCANO

Thank you Daniel.

Archimedes & A3000 Owners!

Quite a few Archimedes owners are apparently still unaware of ***Archive Magazine*** and the various services that Norwich Computer Services provide.

- **Archive Magazine**, now in its third year, provides vast quantities of information about Archimedes computers. (£17 for 12 issues each approx 60 pages A5.)
- **Archive Bulletin Board** keeps you in touch, on a day-to-day basis, with what is happening in the world of Archimedes. Part of it is open for public access, so give it a call on 0603–745932, scrolling, 8n1, up to 2400, 3 lines.
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Talking big

Steve Turnbull explores a new concept in programming on the 32 bit Acorn machines

Product: Smalltalk-80
Price: £540
Supplier: Smalltalk Express Ltd., Denmark House, The Broadway, London NW9 7BW
Tel: 01 200 0220
Requirements: BBC A3000 or Archimedes series, with 4Mb ram plus hard drive.

BASIC has always been the standard programming language on home micros, bar one which used Forth. But Basic is very primitive as languages go – even BBC Basic now lags well behind the frontiers of programming – and it's all because of OOP.

Smalltalk-80 is an object-oriented programming language, now available for the Acorn Archimedes – as long as you've also got a 4Mb machine and a hard disc with 6Mb to spare.

Now that's a lot of money and resources just for running just another language – or it would be, but then Smalltalk isn't just another language – it's object-oriented.

If you haven't a clue what object-oriented programming actually is you'd better read the OOPS! panel before continuing.

The Smalltalk-80 package comes with two discs and a 250-page manual which gives a rundown on what this implementation provides. If you want to learn how to program in Smalltalk you'll have to get a book on that yourself, but plenty references are provided in the manual.

OOPS!

Object-oriented programming requires a radical change in approach from ordinary programming, yet it more nearly matches the real world. Let's see what all the fuss is about.

If you imagine a real-world object like a cat not only do you see obvious physical attributes such as four legs, tail, good night sight, but there's also behaviour – hunts alone, affectionate, and so on.

Then there's the differences between domestic and wild cats – they have a great deal in common, but some variance in both physical attributes and behaviour. From there what about dogs in relation to them? They're all mammals and, because of this, have most of their physical features in common. But their behaviour is completely different.

Many computer languages allow a complex structure of variables, so you could create something which represented the physical attributes of mammals but it wouldn't be very easy. But only OOPs allow you to have a hierarchy of both attributes and behaviour – and with it you could model the whole living world.

For example, you could create a class of mammals and specify a method by which they move around, let's say called locomotion – this would normally be on foot. You can then create sub-classes like cats and dogs, and because they do move around on foot they simply inherit their method of locomotion.

But whales are mammals too, but they swim, so OOPs allow you to redefine Locomotion for whales and any of its sub-classes.

Now within our natural world program we may have a variable *creature* which needs to move – but we don't know whether *creature* is a cat, dog, whale, bird or snake, and with OOP we don't need to. All we need is:

```
creature locomotion
```

and the language selects the right method for us. And that's what makes OOPs in general – and Smalltalk in particular – so radical.

Installing the system is fairly simple: Insert disc one, double-click the InstallST icon, and insert disc two when instructed. Simple? Well not quite. The manual gave those instructions, but halfway through installation I was asked a number of questions about whether I wanted to delete certain files – points which the manual failed to mention.

Later it became apparent that half the

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code on the two discs is held in a compacted format and the installer wants to know whether to delete the originals from the hard disc after expansion.

Smalltalk-80 is a (fairly) standard implementation of the language by an American company called ParcPlace Systems and is available on many powerful micros, like the Sun workstations and Apple Mac II.

This theoretically means that the code is portable. Unfortunately there are a number of enhancements – they are genuine improvements – which make the Archimedes software non-transferrable.

The other disadvantage is that since it wasn't designed for our favourite 32 bit machines, it's not multi-tasking. Thankfully though it does have its own window environment which makes it fairly comfortable to use, as the basic concepts are the same.

Smalltalk-80 is an interpreted language, which means that you can type in an instruction and have it carried out instantly, and the interpreter only runs to about 50k, a similar size to Basic.

The interpreter itself carries out only the most primitive operations of Smalltalk, everything else being built on top, as it is in languages like Forth or Logo. Each new operation you add becomes equivalent to an extension of the basic language itself, which allows you to create an environment that suits you exactly.

What you get with Smalltalk-80 is a complete desktop-style environment where you can develop your own applications and save them as an image. Next time you start work just reload the image you were last working on and you return to exactly the state you were in when you saved, including all highlighted text areas, open windows and so on.

The system is designed around the concept of projects and you can create new projects from a pop-up menu and instantly start work. Or reload an old project, transfer fully tested sections of code between projects, or sub-projects and so on.

Because Smalltalk is extensible, you can re-use the code written by ParcPlace in your own work. Then if you're feeling really daring, you can get down to the nitty-gritty and modify the desktop code to appear as you want.

More importantly, you can do this with the confidence that your modifications won't mess up any other part of the system – it's the nature of the beast.

Let's say, for example, that you'd rather have the menu item that's currently highlighted flashing rather than just with inverted colours. Simply locate the piece of code that highlights the menu option, alter it to flash, and that's it. From the moment that code is installed all menu highlights will flash.

Little Smalltalk

Smalltalk Express also sells a product called Little Smalltalk which provides a subset of the facilities of the language. It costs £30.

It's impossible to describe such an extensive implementation in a short space as well as explain what the language can do. The full price may seem excessive but considering the quality of product you're buying it's worth it. For a Sun workstation it costs £2,725, so it's a good deal for the Archimedes.

Summing up

Smalltalk-80 is no toy, but a complete implementation of this fascinating language. Bearing in mind that it's not multitasking, this product brings to the most powerful of home micros the most powerful of interpreted languages.

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ARCHIMEDES JOYSTICK

THE DELTA-CAT mouse eliminator is a sprung return to centre, light weight, light action joystick which plugs in to the mouse port of any Archimedes series computer and will immediately operate mouse-driven software such as ZARCH.

Moving the stick a little will simulate moving the mouse slowly in the direction that the stick is pointing. The greater the movement of the stick the faster it will move. Thus you can move the pointer anywhere quickly around the screen and slow down for accurate positioning.

The real benefit of the DELTA-CAT comes with custom written software such as the INTERDICTOR jetfighter simulator from CLARES MICRO PRODUCTS. Impact's Soccer Game – Arcade Soccer, and more programs to come soon.

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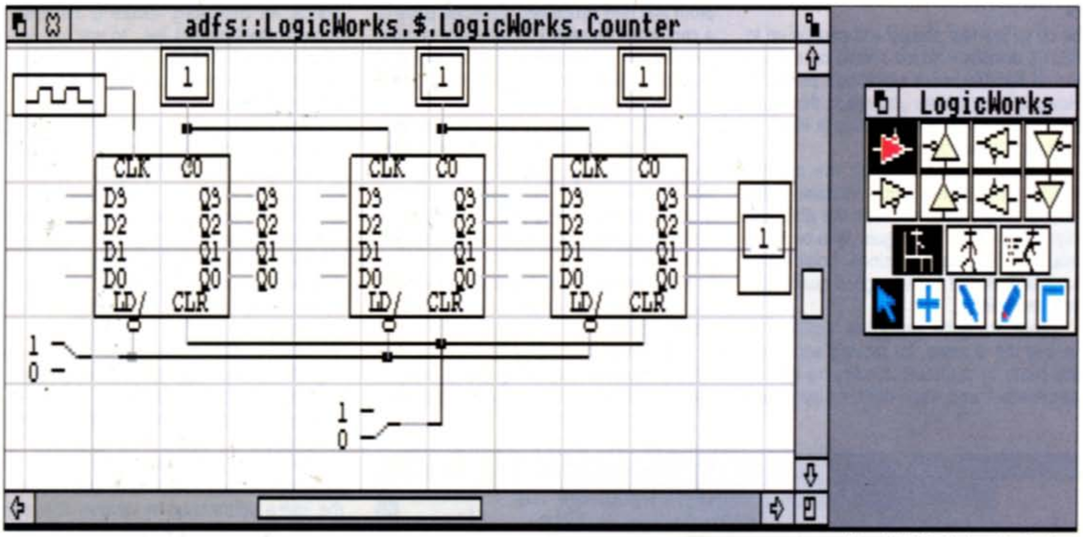

A LogicWork window plus toolbox

Look – no wires!

Terry Blunt tries out a program which helps you get circuit designs right first time – and without a single soldered joint

Product: LogicWorks
Price: £172.50
Supplier: Callancroft, 96 High Road, Byfleet, Surrey KT14 7QT
Tel: 09323 42137

THE factor most likely to discourage an amateur circuit designer with a low budget from trying out a new idea is the knowledge that you can waste a great deal of time and money only because of unforeseen limitations in the circuit components.

LogicWorks, from Capilano Computing, is designed to get round this problem by allowing you to simulate digital circuits, from the simplest to ones of very high complexity.

Originally developed for the American market on the Apple Mac, LogicWorks is written in C and has been ported across to the Archimedes – apparently without any loss of features. The move to the Arc is aimed at the home electronics enthusiast as well as the small business and education markets. Unfortunately my review copy had a couple of bugs though no doubt they'll get sorted out.

The application is fully multi-tasking and sits on the icon bar in the normal way but doesn't support interactive help. The icon used is an obvious one consisting of three gates wired together. A password system is the only copy protection and is fairly unobtrusive.

LogicWorks is very memory hungry, requiring a WimpSlot of at least 600k to start up. It is designed for machines with 2Mb or more, although there are plans for a version with a sub-set of the principal features capable of working on 1Mb machines. Using the application is quite unremarkable in that it conforms well with recommended DeskTop practice.

When you start a new circuit you are presented with two windows, one for the circuit you want to design and the other for timing. Circuits can use all normal digital devices, drawn in their conventional diagramatic forms. They are selected from a menu and dragged with the mouse to the required positions, with interconnections being drawn in afterwards.

For convenience, layout snaps to a grid, but this can be switched off for a clearer display. Editing your circuit has a similar feel to using !Draw, so is quite quickly learned.

Many features are accessed by clicking Menu over the circuit window but a small tools pane is also attached to the circuit window,which has most used editing and running options. Further duplication is provided by some key short cuts.

I rather think the tools pane is too small. Even on a good multi-sync monitor in Mode 20 it's not easy to distinguish between the zap and pencil icons – which could lead to unfortunate consequences.

Gates, counters, flip-flops, shift-registers and many more devices are provided by several libraries of device types. Apart from other parameters, any device can have a unique delay time set, which in itself goes a long way to a real world simulation.

An experienced designer will tell you that small cumulative timing errors can produce some of the biggest headaches.

Input and output are catered for with switches, probes and hex displays, and the results of any significant floating inputs give a suitable undefined output state which will correctly be transmitted to all relevant later devices. Switches are real, in that by clicking on them you can change their state while your circuit is running. A circuit can

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be up to five feet square and contain up to 32,767 devices – which should be enough for all but the most ambitious projects. However long before you reach this number multi-tasking performance is likely to degrade considerably.

Printing will be through the normal drivers, although this wasn't available in the review copy I had, nor was the ability to create draw files. This, again, is to be made available in release versions. LogicWorks uses anti-aliased fonts for good quality display and printing.

There are quite extensive facilities for scaling the drawing, for moving and copying parts of a circuit, modifying device parameters and even defining your own prom and ram structures. Selected parts of a circuit can be saved for later use in other circuits, so you can build up a library of standard circuit blocks and patch them together as needed.

Any signal link can be given a name and will then appear on the timing chart, allowing you to see logic levels dynamically. The timing window scrolls sideways continuously, effectively giving you a multi-channel datascope. You can set the speed to either *walk* or *run*.

Alternatively you can freeze the simulation and then single step to examine critical times in detail.

The timing chart will also be printable in release versions, enabling you to keep a permanent record of your circuit's performance. An interesting feature is the ability to make modifications live, so you can see what to expect from hotwiring real devices in and out without running the risk of destroying them.

I was a little disappointed by the system of libraries adopted. It requires the editing of a setup text file identifying the names of libraries and the name of the library directory. I think it would have been better to use the same approach used by !Fonts and !System, where resources can be added or deleted as you please and will be sensed automatically no matter where they, or their directories, are.

On the plus side, the fact that LogicWorks is portable and well established in America suggests that there should be access to a large pool of additional libraries fairly soon.

The manual, admittedly only a draft, is extensive but seems a little chaotic. I found the same information in various different places, but things I was looking for just didn't seem to be reported.

In particular, I designed a simple switch synchroniser and de-bouncer, but was unable to find out how to stop the changeover of the real switch from synchronising itself with the clock, thus making my circuit rather pointless.

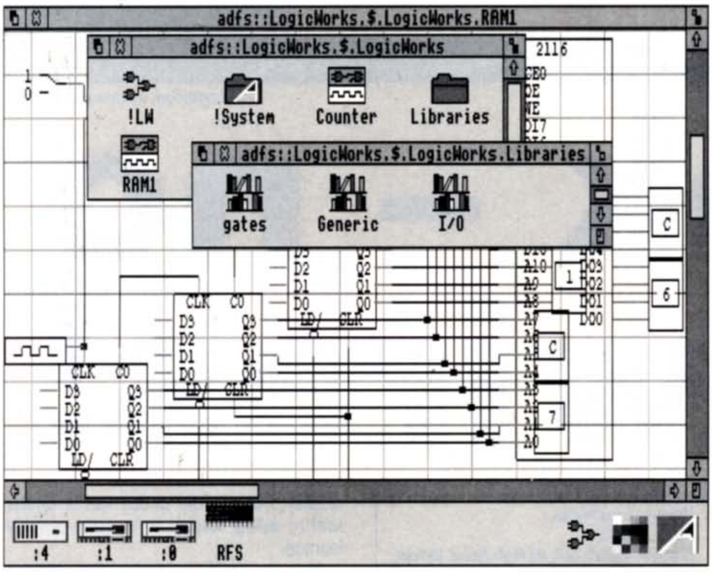
I found I could overcome the problem by having another faster clock doing nothing, but this seems a rather inelegant solution.

The manual also contains a tutorial section which goes step-by-step though loading and saving existing circuits as well as creating a new circuit from scratch. This seemed quite accurate, but again I felt that it could be improved. Quite a lot of space is wasted trying to show you how to use the DeskTop.

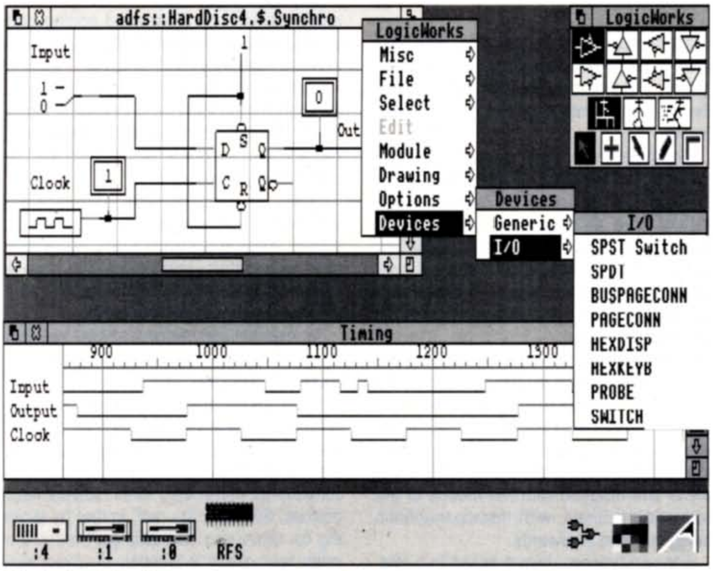
There are plans to incorporate some analogue simulation, as well as interfacing for CAD systems so that you could ultimately produce actual printed circuit boards directly from a design. This could be of very real interest for specialist one-offs, or to a relatively small business, where the cost of alternative systems might be prohibitive.

It's difficult to see a clear application in education, apart from using pre-designed circuits for display or live testing with faults built in deliberately.

With current pressure of time on most educational computers, I think it unlikely that the machine would be allowed to be tied up for the time it would take a relative novice to enter an untested circuit design.


adfs::LogicWorks.$.LogicWorks.RAM1
adfs::LogicWorks.$.LogicWorks
!LW
!System
Counter
Libraries
RAM1
adfs::LogicWorks.$.LogicWorks.Libraries
gates
Generic
I/O
2116
CLK
CO
D3
D2
D1
D0
Q3
Q2
Q1
Q0
LD/
CLR
C
6
1
7
:4
:1
:0
RFS

The LogicWorks component library


adfs::HardDisc4.$.Synchro
Input
1
0
Clock
Out
D
S
Q
C
R
LogicWorks
Misc
File
Select
Edit
Module
Drawing
Options
Devices
Devices
Generic
I/O
I/O
SPST Switch
SPDT
BUSPAGECONN
PAGECONN
HEXDISP
HEXKEYB
PROBE
SWITCH
LogicWorks
Timing
900
1000
1100
1200
1300
Input
Output
Clock
:4
:1
:0
RFS

Viewing the timing diagram

Summing up

In spite of the problems, most of which I think should be regarded as teething, I found this package easy to use and promising. Although it can't completely replace physical construction and testing, LogicWorks can considerably reduce the likelihood of failure from design errors.

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Michael Leete offers a micro version of a card patience game that'll keep you cogitating

Scorpion

A SCORPION keeps its sting in its tail – and so does Scorpion Patience. It's unbelievably easy to overlook an impasse, either dealt or created by careless moves, until the game is well advanced.

So it takes a good degree of skill to make the right moves and circumvent obstacles although, fundamentally, success mostly depends upon the fall of the cards.

Random movement may well be successful but the favoured technique is to calculate sequences of moves which will uncover the hidden cards or make a space.

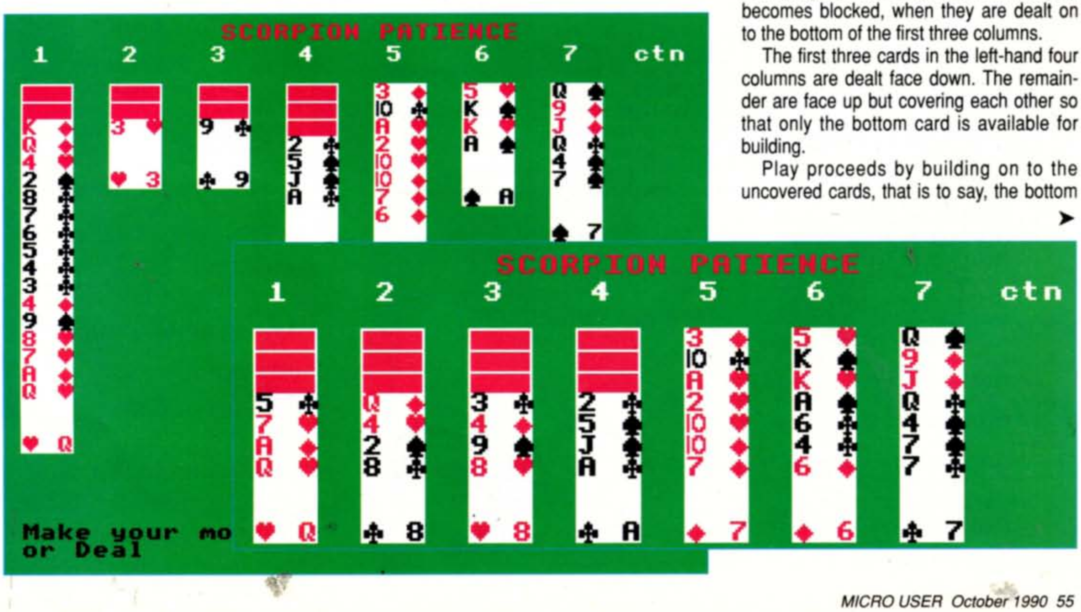
It has been estimated that the game will come out about once in every 10 games. This micro version, which scrupulously follows the rules, was considerably less successful in its working-up trials, to the point that verifying the end-of-game coding was far from easy.

Cards are dealt into a tableau of seven rows and seven columns, keeping the remaining three cards in reserve until play becomes blocked, when they are dealt on to the bottom of the first three columns.

The first three cards in the left-hand four columns are dealt face down. The remainder are face up but covering each other so that only the bottom card is available for building.

Play proceeds by building on to the uncovered cards, that is to say, the bottom

➤



SCORPION PATIENCE

Make your mo
or Deal

➤

card in each column, in suits in descending values.

A card for building may be selected from anywhere in the tableau but all the cards below it go with it. When an empty column results from building, it may only be filled with a king, which, similarly, takes with it all the cards below it. The object is to finish with four columns in suits from king to ace.

The single pack is shuffled and dealt automatically by the micro. Movement between the columns is effected by typing the column numbers at the prompt and D – for Deal – supplies the last three cards. To fill a space, type the column numbers in the usual way. The micro then beeps softly and cycles down the possible kings to be moved.

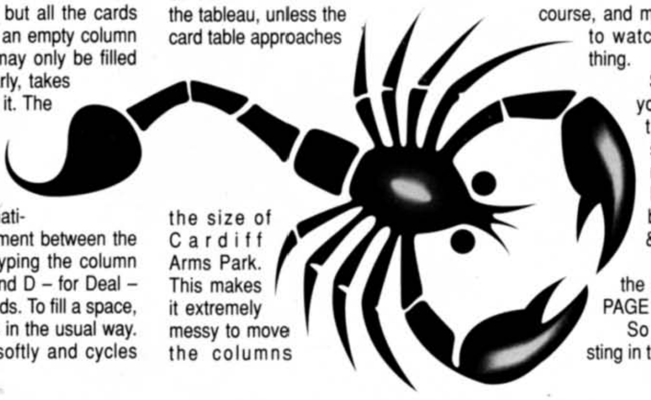
Played with real cards, the columns sometimes become very long and have to be curled round the base of the tableau, unless the card table approaches the size of Cardiff Arms Park. This makes it extremely messy to move the columns about. Also the deal requires some dexterity to preserve neat rows and columns in the tableau.

The micro keeps everything tidy, of course, and moving long columns is a joy to watch compared with the real thing.

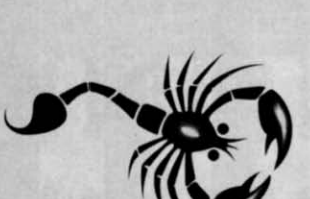
So type in the listing, ensure you've made no errors using the checksums and then save the program. Because memory is tight in a standard Model B the program has to be run with PAGE set to &1100.

On disc-based machines the program just re-runs itself if PAGE isn't set right.

So have fun, and beware the sting in the tail!



```
   10 REM >Scorpion Patience
   20 REM by Michael Leete
   30 REM (c) The Micro User
   40 :
   50 IF PAGE<&8000 IF PAGE>&1100 THEN P
AGE=&1100:CHAIN"SCORPIO"
   60 ON ERROR REPORT:PRINT" at ";ERL:EN
D
   70 MODE7:DIM b$(7),c%(7)
   80 VDU23,224,54,127,127,127,62,28,8,0
   90 VDU23,225,8,28,62,127,127,127,28,6
2
  100 VDU23,226,0,8,28,62,127,62,28,8
  110 VDU23,227,8,28,28,107,127,107,8,28
  120 VDU23,228,128,228,228,244,252,252,
252,254
  130 VDU23,229,78,91,81,81,81,91,78,0
  140 VDU23,230,0,127,127,127,127,127,12
7,127
  150 VDU23,231,0,255,255,255,255,255,25
5,255
  160 VDU23,232,0,254,254,254,254,254,25
4,254
  170 VDU23,233,254,254,254,254,254,254,
254,254
  180 VDU23,234,254,254,254,254,254,254,
254,0
  190 VDU23,235,255,255,255,255,255,255,
255,0
  200 VDU23,236,127,127,127,127,127,127,
127,0
  210 VDU23,237,127,127,127,127,127,127,
127,127
  220 VDU23,238,127,63,63,63,47,39,39,1
  230 VDU23,1,0;0;0;0;0;
  240 PRINTSPC(10)"SCORPION";:VDU140
  250 PRINTSPC(3)"by Michael Leete"
  260 PRINT'''"Build the Tableau in desc
ending values"
  270 PRINT"of the same suit.  Transfer
cards from"
  280 PRINT"column to column by typing t
he number"
  290 PRINT"of the 'source' column follo
wed by the"
  300 PRINT"number of the 'target' colum
n."
  310 PRINT:PRINT"Empty columns may be f
illed with Kings":PRINT"at will.  All th
e cards below them":PRINT"go too."
  320 PRINT'"When a King is moved, you a
re asked to":PRINT"type the suit you wan
t, in sequence."
  330 PRINT'"If a column becomes longer
than twenty-":PRINT"one cards, it is con
tinued on the right":PRINT"hand side of
the screen."
  340 PRINTTAB(13,24)CHR$(134)"Press SPA
CE";:A=GET
  350 k$="":v$="#A23456789"+CHR$229+"JQK
0"
  360 p$="2H2S2D2C3H3S3D3C4H4S4D4C5H5S5D
5C6H6S6D6C7H7S7D7C8H8S8D8C9H9S9D9C"+CHR$
229+"H"+CHR$229+"S"+CHR$229+"D"+CHR$229+
"CJHJSJDJCQHQSQDQCKHKSKDKCAHASADAC"
  370 z$=CHR$(228)+CHR$(228)+CHR$(228)
  380 MODE1:A%=RND(-TIME)
  390 VDU23;8202;0;0;0;19,2,2;0;19,3,7;0
;
  400 PROCinit
  410 GCOL0,130:COLOUR130:CLG
  420 PROCd:PROCs:PROCtableau
  430 REPEAT:COLOUR0
  440 PRINTTAB(16,29)SPC4
  450 REPEAT A$=GET$:UNTIL INSTR("123456
7DK",A$)<>0
  460 IF A$="D" PROCDeal:GOTO 520:ELSE P
RINTTAB(16,29)"from ";A$:f%=VAL(A$):PRIN
TTAB(23,29)"to ":*FX21
  470 REPEAT B$=GET$:UNTIL INSTR("123456
7",B$)<>0
  480 PRINTTAB(26,29)B$:t%=VAL(B$):*FX21
  490 IF A$=B$ p%=0
  500 A%=FNm(f%,t%)
  510 IF NOTA% PROCe ELSE PROCtck
  520 PRINTTAB(21,29)SPC(10):PROCend:UNT
IL I%
  530 COLOUR1:PRINTTAB(7,27)"Congratulat
ions - You win.":PRINTTAB(28)SPC(32)
  540 PRINTTAB(1,30)SPC(12)
  550 FOR X=1 TO 10:SOUND1,-5-X,110+X,1:
SOUND1,-5-X,130+X,1:NEXT:*FX21
  560 PRINTTAB(12,30)"Play again? (Y/N)"
  570 REPEAT A=GET:UNTIL A=78ORA=89:IF A
=89 RUN ELSE MODE7:END
  580 :
  590 DEFPROCf(C%):R%=0
  600 y%=LEN(b$(C%))
  610 IFy%=0 VDU31,5*C%-4,y%/2+4:PRINTSP
C3:VDU31,5*C%-4,y%/2+5:PRINTSPC3:VDU31,5
*C%-4,y%/2+6:PRINTSPC3:VDU31,5*C%-4,y%/2
+7:PRINTSPC3:ENDPROC:ELSEc$=RIGHT$(b$(C%
),2)
  620 IF y%>40 C%=8:y%=y%-38
  630 IFINSTR("HD",RIGHT$(c$,1))COLOUR1E
LSECOLOUR0
  640 COLOUR131
  650 IFINSTR("H",RIGHT$(c$,1)) THEN c$=
LEFT$(c$,1)+" "+CHR$224 ELSE IF INSTR("D
",RIGHT$(c$,1)) THEN c$=LEFT$(c$,1)+" "+
CHR$226 ELSE IF INSTR("S",RIGHT$(c$,1))
THEN c$=LEFT$(c$,1)+" "+CHR$225 ELSE c$=
LEFT$(c$,1)+" "+CHR$227
  660 VDU31,C%*5-4,y%/2+3:PRINTc$
  670 VDU31,C%*5-4,y%/2+4:PRINTSPC3
  680 VDU31,C%*5-4,y%/2+5:PRINTSPC3
  690 t$=LEFT$(c$,1):c$=c$+" "+t$:c$=RIG
HT$(c$,3)
  700 VDU31,C%*5-4,y%/2+6:PRINTc$
  710 COLOUR130
  720 VDU31,5*C%-4,y%/2+7:PRINTSPC3
  730 VDU31,5*C%-4,y%/2+8:PRINTSPC3
  740 FOR S%=1 TO 7
  750 y%=LEN(b$(S%))
  760 IF y%<41 R%=R%+1
  770 NEXT
  780 IF R%=7 FOR T%=3 TO 8:PRINTTAB(35,
T%)SPC4:NEXT
  790 ENDPROC
  800 :
  810 DEFFNm(s%,d%)
  820 l$=RIGHT$(b$(d%),2):IFl$=""l$="0"
  830 flag%=0
  840 n$=MID$(v$,INSTR(v$,LEFT$(l$,1))-1
,1)
  850 o$=RIGHT$(l$,1)
  860 g$=b$(s%)
  870 p%=1:IF s%<5 p%=c%(s%)*2-1
  880 IF p%>LEN(g$)-1:=FALSE
  890 FORJ%=p%TO LEN(g$) STEP2
  900 x$=MID$(g$,J%,1):y$=MID$(g$,J%+1,1
)
  910 IF n$="K" o$=y$
  920 IF(x$=n$ANDy$=o$) THENp%=J%:J%=LEN
```



```
(g$)
  930 NEXT
  940 IF x$="K" PROCking:IF flag%:p%=p%+
2:GOTO880
  950 IFp%<1THEN=0ELSEc$=MID$(b$(s%),p%,
2):IFINSTR(c$,n$)=0THEN=0 ELSE IF FNT TH
EN=0ELSEq$=MID$(g$,p%,LEN(g$)-p%+1)
  960 FORX%=1TOLEN(q$)STEP2:b$(d%)=b$(d%
)+MID$(q$,X%,2):b$(s%)=LEFT$(b$(s%),LEN(
b$(s%))-2)
  970 PROCf(d%):PROCf(s%)
  980 NEXT
  990 IF LEN(b$(s%))=c%(s%)*2-2 THEN c%(
s%)=c%(s%)-1
 1000 IF c%(s%)<0 c%(s%)=0
 1010 =TRUE
 1020 :
 1030 DEFPROCe
 1040 SOUND1,-7,9,3:COLOUR1:PRINTTAB(14,
30)"Move disallowed"
 1050 n=TIME:REPEAT UNTIL TIME>n+120
 1060 COLOUR130:PRINTTAB(14,30)SPC(15)
 1070 ENDPROC
 1080 :
 1090 DEFPROCking:COLOUR 1
 1100 IF n$<>"K" ENDPROC
 1110 PRINTTAB(14,30)n$+y$;"? Y/N":VDU7
 1120 REPEAT A=GET:UNTIL A=78 OR A=89
 1130 IF A=78 flag%=1:ELSE flag%=0
 1140 COLOUR 0
 1150 PRINTTAB(14,30)SPC(9)
 1160 ENDPROC
 1170 :
 1180 DEFFNT
 1190 d$=RIGHT$(l$,1)
 1200 e$=RIGHT$(c$,1)
 1210 IF b$(d%)="" THEN =0
 1220 IF d$<>e$ THEN=TRUE ELSE=0
 1230 :
 1240 DEFPROCDeal
 1250 IF f$="" PROCe:ENDPROC
 1260 PRINTTAB(1,30)"or ESCAPE"
 1270 FOR I%=1 TO 3
 1280 b$(I%)=b$(I%)+MID$(f$,2*I%-1,2)
 1290 PROCf(I%):PROCtck
 1300 NEXT:f$="":ENDPROC
 1310 :
 1320 DEFPROCend:I%=0
 1330 FOR J%=1 TO 7
 1340 K%=LEN(b$(J%))
 1350 IF K%=26 I%=I%+1
 1360 NEXT
 1370 IF I%<>4 I%=0:ENDPROC
 1380 I%=0:p$=MID$(v$,2,13)
 1390 FOR J%=1 TO 7
 1400 K%=LEN(b$(J%))
 1410 IF K%=0 THEN GOTO1500
 1420 M$=RIGHT$(b$(J%),1)
 1430 FOR L%=23 TO 1 STEP-2
 1440 N$=MID$(b$(J%),L%+1,1)
 1450 IF N$<>M$ I%=1
 1460 M%=INSTR(p$,(MID$(b$(J%),L%,1)))
 1470 N%=INSTR(p$,(MID$(b$(J%),L%+2,1)))
 1480 IF M%-N%<>1 THEN I%=1
 1490 NEXT
 1500 NEXT
 1510 IF I% THEN I%=0:ENDPROC ELSE I%=1:
ENDPROC
 1520 :
 1530 DEFPROCtck:SOUND0,-5,5,1:FOR Z%=1
TO 600:NEXT:ENDPROC
 1540 :
 1550 DEFPROCtableau
 1560 VDU5:MOVE54,960:GCOL0,3:PRINT"1
 2   3   4   5   6   7   ctn"
 1570 VDU4
 1580 FORr%=7TO1 STEP-1:FORC%=1TO7:VDU31
,C%*5-4,11-r%
 1590 b$(C%)=b$(C%)+RIGHT$(f$,2):f$=LEFT
$(f$,(LEN(f$)-2))
 1600 IF c%(C%) COLOUR1:COLOUR131:PRINTy
$:FOR X=1TO200:NEXT:ELSE COLOUR130:PROCf
(C%)
 1610 COLOUR1:COLOUR131:IF C%<5 AND r%>3
 AND r%<7 VDU31,C%*5-4,11-r%-1:PRINTz$:C
OLOUR130
 1620 c%(C%)=c%(C%)-1:IF c%(C%)<1 c%(C%)
=0
 1630 PROCtck
 1640 NEXT
 1650 NEXT
 1660 FOR I%=1 TO 4
 1670 c%(I%)=4
 1680 NEXT
 1690 COLOUR0:COLOUR130
 1700 VDU31,1,29:PRINT"Make your move"
 1710 VDU31,1,30:PRINT"or Deal"
 1720 ENDPROC
 1730 :
 1740 DEFPROCs
 1750 f$="":D%=52
 1760 FORI%=1TO52
 1770 A%=INT(RND(1)*D%+1)
 1780 f$=f$+MID$(p$,2*A%-1,2)
 1790 L$=LEFT$(p$,(A%-1)*2)
 1800 R$=RIGHT$(p$,(LEN(p$)/2-A%)*2)
 1810 p$=L$+R$
 1820 D%=D%-1
 1830 NEXT
 1840 p$=f$
 1850 ENDPROC
 1860 :
 1870 DEFPROCinit
 1880 FORI%=1TO7
 1890 b$(I%)=STRING$(52,"  ")
 1900 b$(I%)=""
 1910 c%(I%)=0
 1920 NEXT
 1930 FOR I%=1 TO 4
 1940 c%(I%)=3
 1950 NEXT
 1960 U%=0
 1970 p%=1:c$="  "
 1980 z$=CHR$(230)+CHR$(231)+CHR$(232)
 1990 *FX212,216
 2000 y$=CHR$230+CHR$231+CHR$232+CHR$10+
CHR$8+CHR$8+CHR$8+CHR$237+CHR$238+CHR$23
3+CHR$10+CHR$8+CHR$8+CHR$8+CHR$237+CHR$2
28+CHR$233+CHR$10+CHR$8+CHR$8+CHR$8+CHR$
236+CHR$235+CHR$234
 2010 ENDPROC
 2020 :
 2030 DEFPROCd
 2040 GCOL0,1
 2050 VDU5:MOVE392,1000
 2060 PRINT"SCORPION PATIENCE"
 2070 VDU5
 2080 ENDPROC
```

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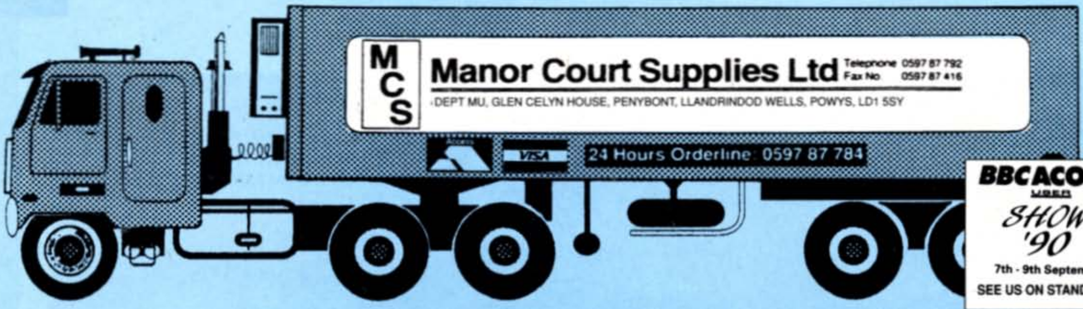
```
  10 =    0 0   360 = C07A 6   710 = 1552 B  1060 = FC31 F
  20 =    0 0   370 = CC12 6   720 = BB3E 0  1070 = ED0F C  1410 = D2CE 8  1750 =  AE7 6
  30 =    0 0   380 = 8BCF 9   730 = DEC7 0  1080 = 9719 B  1420 = 2ACF 3  1760 = F483 8
  40 = 9719 9   390 = DCFF 2   740 = 4A62 B  1090 = 4D8A 4  1430 = 9D4B 6  1770 = 5F0A D
  50 = 34CD 4   400 = DEBB 5   750 = 45B4 4  1100 = 13D0 8  1440 = 61D1 2  1780 = D779 1
  60 = EEE7 5   410 = BCEF 9   760 = F9E8 D  1110 = E665 8  1450 = D565 C  1790 = C5E7 E
  70 = 1151 A   420 = B0FA D   770 = 2C83 5  1120 = BB85 5  1460 = 27E4 C  1800 = 11E2 1
  80 = 9857 A   430 = D804 1   780 = 3900 B  1130 = 9817 8  1470 = 8FA5 1  1810 = 6303 E
  90 = B672 6   440 = 9BE5 3   790 = ED0F 4  1140 = 2316 F  1480 = FB9B 6  1820 = D824 A
 100 = 7FD3 F   450 = 2964 E   800 = 9719 C  1150 = 633A D  1490 = 2C83 7  1830 = 2C83 B
 110 = 19C0 7   460 = 4D4C 4   810 = FBB5 5  1160 = ED0F 9  1500 = 2C83 F  1840 = A2A7 8
 120 = 353C F   470 = 2836 4   820 =  649 E  1170 = 9719 0  1510 = FAF7 A  1850 = ED0F 6
 130 = B6C3 9   480 = 7545 4   830 = D51A A  1180 = EC0E 8  1520 = 9719 5  1860 = 9719 8
 140 = A4AC F   490 = 614F F   840 = 3245 4  1190 = 8938 1  1530 = CE6F 7  1870 = 344C 5
 150 = 42AC C   500 = B331 E   850 = 8D83 9  1200 =  7E2 0  1540 = 9719 B  1880 = FF9A F
 160 = 5466 7   510 = C7B5 4   860 = A46B F  1210 = F20B 9  1550 = 5D9F 4  1890 = 26B1 6
 170 = 97F7 4   520 = EE45 8   870 = 8B96 A  1220 = D91B A  1560 = 7C2B 7  1900 = 9964 E
 180 = CE84 D   530 = 7495 4   880 = C29E E  1230 = 9719 C  1570 = 765B D  1910 =  504 3
 190 = 173B D   540 = C007 F   890 = F085 A  1240 = D0E5 F  1580 = B2E4 1  1920 = 2C83 B
 200 = A2A9 A   550 = 8127 4   900 = AF5F A  1250 = 1575 C  1590 = 1DFD 5  1930 = D6C9 1
 210 = C070 B   560 = 8B7E 4   910 = 6B3B 3  1260 = 9E6F 5  1600 = 9AE4 8  1940 = 3567 D
 220 = 5AF7 8   570 = EAE8 D   920 = EAF7 B  1270 = A62E E  1610 = BA0C 0  1950 = 2C83 C
 230 = 8EF3 9   580 = 9719 B   930 = 2C83 C  1280 = 1900 5  1620 = D625 5  1960 = E1D2 0
 240 = FC40 C   590 = DF39 4   940 = A603 4  1290 = 5E5B 0  1630 = F559 6  1970 = 6166 B
 250 = DAC8 E   600 = 5E13 C   950 = 833F 1  1300 = F7D7 3  1640 = 2C83 5  1980 = B817 A
 260 = E5DD D   610 = 641B 8   960 = 8CAB 1  1310 = 9719 E  1650 = 2C83 E  1990 = D584 F
 270 = E5C8 0   620 = E6A7 7   970 = E1D8 9  1320 = BAA7 3  1660 = D6C9 C  2000 = B6DF 7
 280 = C33C 4   630 = 712D 6   980 = 2C83 2  1330 = 2EDF 3  1670 = 4580 8  2010 = ED0F 0
 290 = 8191 7   640 =  573 C   990 = FAD0 B  1340 = F27E B  1680 = 2C83 0  2020 = 9719 0
 300 = C3E3 A   650 = B2F9 8  1000 = F206 5  1350 = 2B43 B  1690 = 1429 A  2030 = 7E44 E
 310 = 8326 6   660 = 1695 6  1010 = 453B 4  1360 = 2C83 9  1700 = 46F3 E  2040 =  32F 0
 320 = 3636 6   670 = ECEE A  1020 = 9719 6  1370 = 6ED4 A  1710 = F618 F  2050 = C0B3 1
 330 = 63DB 5   680 = 46BF 6  1030 = 6E65 7  1380 = 7689 A  1720 = ED0F F  2060 = EE17 9
 340 = A034 8   690 = AECD 3  1040 = F114 D  1390 = 2EDF 9  1730 = 9719 F  2070 = 667A 8
 350 = 3DC5 6   700 = 35C2 3  1050 = B2B0 8  1400 = F27E 9  1740 = 1C92 6  2080 = ED0F 1
```



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The winner of our fun competition will be provided with a supermarket trolley and turned loose in the aisles of Wembley Conference Centre to grab a bumper selection of gifts.

The Computer Shopper Trolley Dash will take place before the show opens and participating companies will have gifts ready on their stands. Up for grabs by the winning reader of *The Micro User* will be a host of software and peripherals for Acorn machines. It's a chance not to be missed.

To enter the competition look closely at the word grid on this page and pick out the names of six software houses which support the Acorn market. Jot them on a piece of paper – in any order – and send them, marked Trolley Competition, to *The Micro User*, Database Publications, Europa House, Adlington Park, Adlington, Cheshire SK10 4NP.

Entries must be received by Friday, November 2 when a draw will take place to select the winner. Don't forget to include your name, address and telephone number with your entry.

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THE Computer Shopper Show will take place from Thursday, December 6 to Sunday December 9 at Wembley Conference Centre, London. Organised by Blenheim Database Exhibitions (0625 879970) it will be a showcase for displays and demonstrations of all the latest hardware, software and peripherals for home and business computers.

It is open from 10am to 6pm on the Thursday and Friday, from 9am to 6pm on Saturday and from 10am to 5pm on Sunday. It is expected to attract 40,000 visitors to 280 stands, and will feature a special Acorn Village with a major Acorn Conference running in conjunction.

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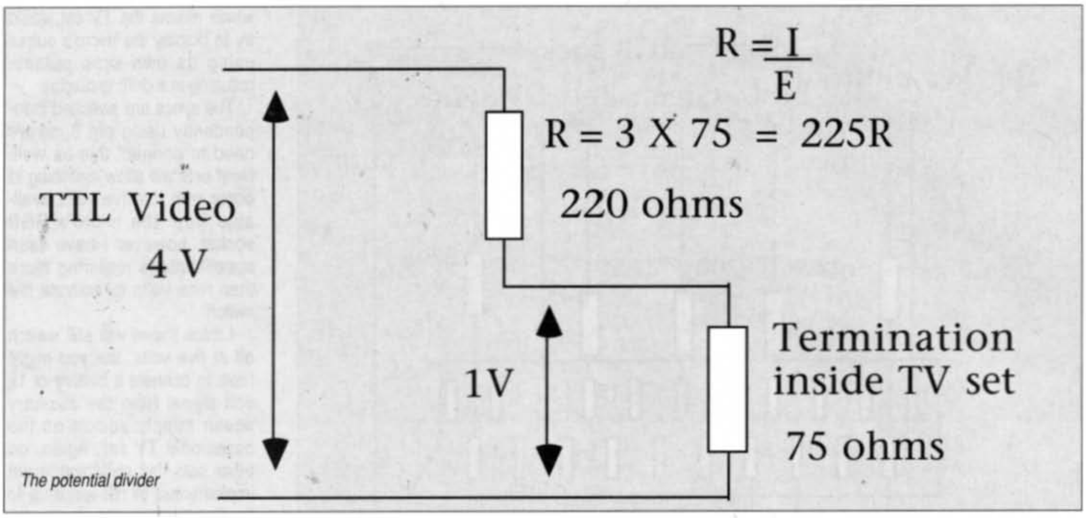

The potential divider

I've SCARTed so I'll finish

Mike Cook plugs himself into an interesting socket

SINCE I looked at how to use a IBM PC monitor with the BBC Micro in the May issue, my mail bag has been full of requests for information about how to use the Scart connector found at the back of most modern TV sets.

It should be quite straightforward to connect up a micro to a Scart socket. However things are complicated by the nomenclature and non-standard way this standard is implemented. It helps to understand why the Scart connector was originally designed.

Its purpose was to connect a teletext unit to a TV set. In order to do this we need to access the RGB video signals and to be able to take the synchronising pulses from the internal TV receiver or the external video source.

In addition, in order to provide video overlays like headlines and subtitles, there must be some way of switching rapidly between the internal and external video signals many times during the period of a frame. It is generally these requirements that lead to confusion when trying to use the Scart with a micro.

Let's start with Table I, a listing of all the signals on the Scart socket. As well as the RGB video signals we want to use, there are others we will need to deal with.

The fact that each signal has its own earth or ground connector often confuses beginners, but in fact only one ground connector need be wired up. If the video were being sent a long distance – over five metres – you would use screened cable for each signal. When it came to wiring up the socket each screen would use its own terminal just to make the back of the plug neat and manageable.

Now we need to connect the RGB signal from our micro to the RGB inputs of the Scart socket, but the Scart's input signals should be one volt peak to peak, that is, a maximum of one volt. Now Acorn computers,the Archimedes excepted, produce a digital video output. This is nominally five volts but in practice is round about four volts.

Can we feed this straight in to the connector? This depends on the TV set. Some will cope with the excess voltage but others will throw a wobbly. Don't worry if your set won't cope with it, it will not cause any damage.

What will happen is that the display will look too bright, the colours will merge and in general it will look out of focus.

If this is the case how do we condition our RGB signals? Well, looking at Table I you will see that the video inputs are terminated with 75Ω. That means in effect there is a resistance to earth of this value on each input.

We can use this resistance as part of a potential divider to cut down our signal to the required value – in short we only need to add a series resistor, which is shown in the diagram above. Note how we can't get the exact resistance required, but there again, the one volt peak to peak requirement is not all that critical.

Having introduced the video into the TV set we need to get the synchronising pulses in – notice in Table I there is no mention of a sync input.

The BBC Micro produces what is known as mixed or composite syncs, that is a mixture of line and frame syncs on the same

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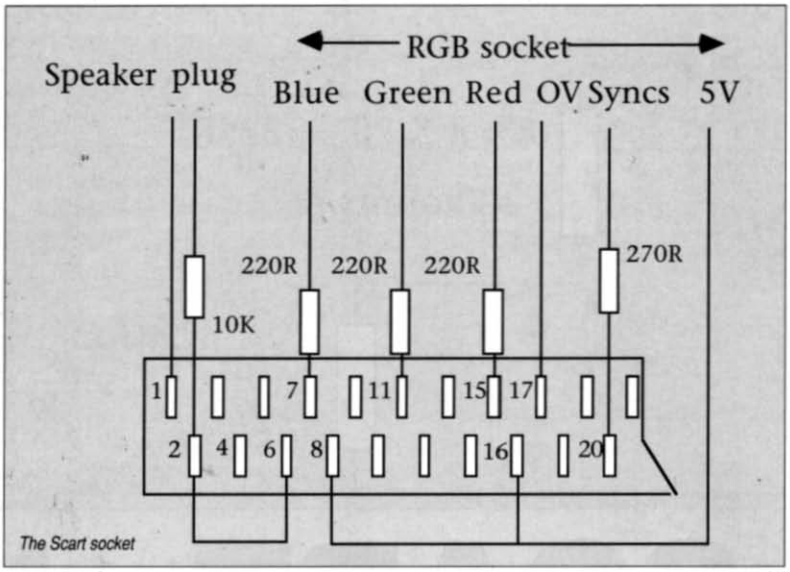

The Scart socket

Pin 1	Audio output (right)
Pin 2	Audio input (right)
Pin 3	Audio output (left)
Pin 4	Audio ground
Pin 5	Blue ground
Pin 6	Audio input (left)
Pin 7	Blue video input 1V ptp 75Ω
Pin 8	Sync source select
Pin 9	Green ground
Pin 10	Intercommunication D^{2}B input
Pin 11	Green video input 1V ptp 75Ω
Pin 12	Intercommunication D^{2}B output
Pin 13	Red ground
Pin 14	D^{2}B ground
Pin 15	Red video input 1V ptp 75Ω
Pin 16	Fast blanking (internal/external video switch)
Pin 17	Sync source select ground
Pin 18	Fast blanking ground
Pin 19	Composite video signal output
Pin 20	Composite video input 1V ptp 75Ω
Pin 21	Socket ground

Table I: The Scart connection list

➤

signal which has to be fed into the composite video input.

Now a composite video input is normally the mixed syncs and the video signal. We could derive this from the video output of our computer, but better results are obtained from the RGB outputs.

Nevertheless we will achieve the desired results if we feed our video output signal here. Doing this requires an extra connector, so the best bet is to cut our logic level sync pulses down to size as we did with our video signals. Some sets require this signal to be a maximum of 0.7 volts peak to peak, so we need a larger resistor, but again it is not critical.

Next comes the switching bit. When we use the micro we want the display to switch to the Scart socket's video inputs. This can normally be done by a switch on the front of the TV set, however pin 16 acts as an overriding switch. However, this is not the whole tale, as while it switches the video signals it doesn't switch the synchronising signals,. which means the TV set would try to display the micro's output using its own sync pulses, resulting in a drifting display.

The syncs are switched independently using pin 8, so we need to connect this as well. Most sets will allow switching to occur with the five volts available from the micro's RGB socket, however I have seen specifications requiring more than nine volts to activate the switch.

I think these will still switch off at five volts, but you might have to connect a battery or 12 volt signal from the auxiliary power supply socket on the occasional TV set. Again, on other sets this switching is not implemented or not wired up to the Scart connector.

This separate switching of sync pulses makes sense in the context of a teletext decoder superimposing on a TV picture, but it is an unnecessary complication for a micro.

Now we come to the audio input. We can use this to channel the sound produced from the micro through the TV set. This has two advantages, first the better size speaker will result in a higher quality and secondly you will have full use with the TV's volume control.

As you can see, the Scart standard specifies stereo inputs even though most TV sets do not have stereo sound systems. We simply need to connect our sound output to both the left and right inputs.

Now the audio sensitivity sometimes differs from set to set but we can use the same technique to match the voltages as we did with the video signals. However the audio line termination is normally about 1kΩ, so we need to use a much higher series resistor. When you remove the existing speaker socket the signal is on the left hand pin with the ground on the right. The audio output can be used to record your sound or to send it to your hi-fi system.

The whole interface is summarised in the diagram above and all the components are available as Body Build Pack No. 64. Note that the speaker connection socket requires the wire to be crimped – the kit will provide a ready-crimped wire. When you get the Scart plug, the individual plugs are supplied loose. All you have to do is to insert at the front the pins you want to use.

Incidently the D^{2}B connections are serial input and output lines to allow communication between a teletext decoder and a TV set so that such things as the screen brightness can be controlled from the teletext remote control.

Well there you have it, having Scarted I did finish. But there's just one thing left: What does Scart stand for? My guess is that the words Standard, Connector and Television are in there somewhere but does anyone know the rest? With that I will leave you until next month.

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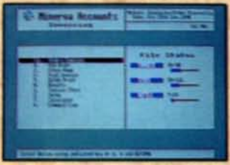

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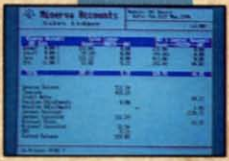

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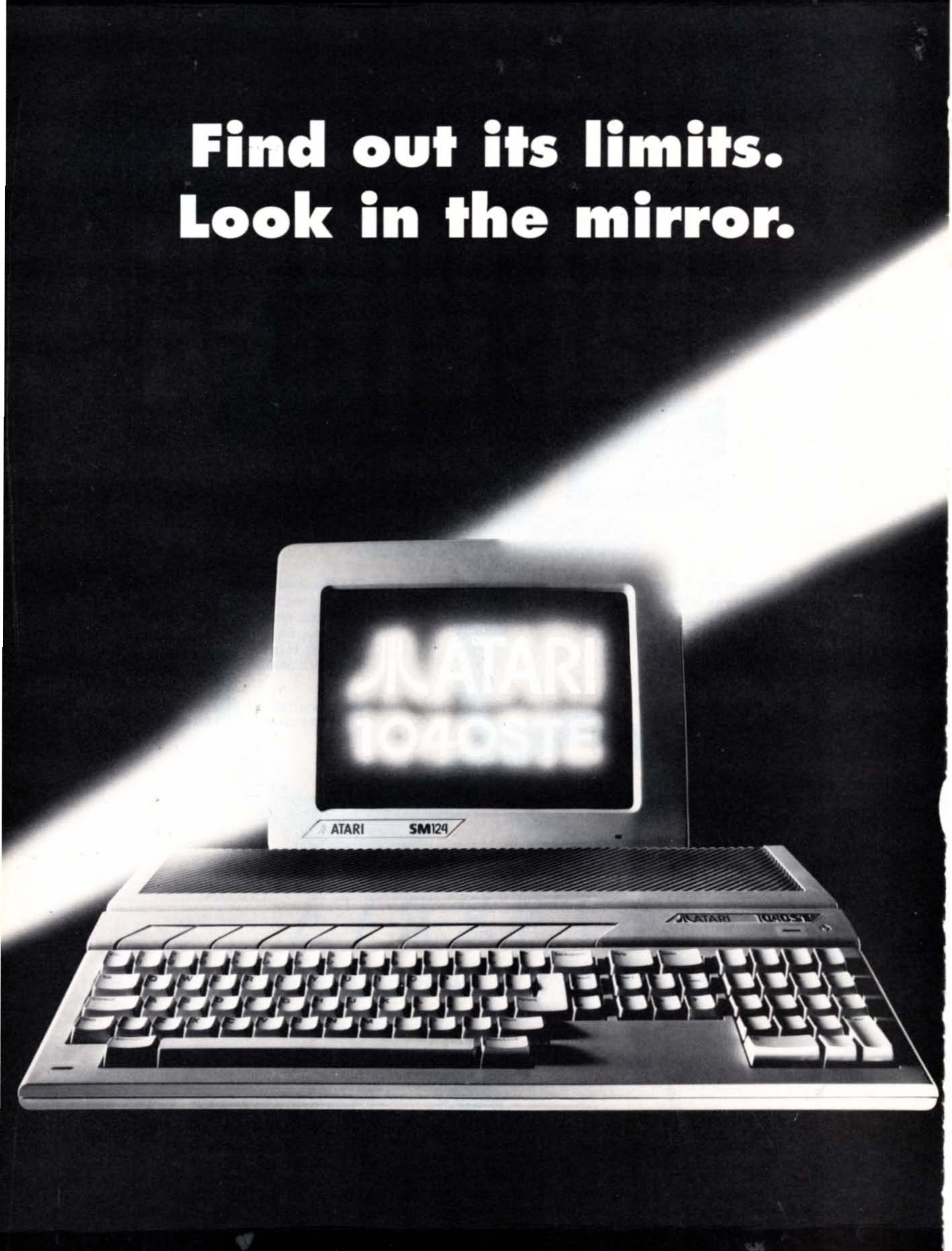
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To complete the picture, it is able to 'phase-lock' its video output to an external video source, permitting direct linking to a Genlocking device.

The 1040 won't just have your eyes swivelling in their sockets. Your eardrums will also take a pounding from the 8-bit PCM stereo sound.

The new PCM (Pulse Coded Modulation) sound system's two chips allow the 1040 STE to replay high-quality sampled sounds, in stereo, without burdening the CPU. Or, for even more of an earblasting, just add a couple of RCA output jacks and power the sounds through your own stereo.

Of course we mustn't forget memory. One megabyte of RAM comes as standard. If that's not enough, the 1040 STE provides four SIMM sockets. Simply plug in some SIMM (Single In-line Memory Module) boards and boost the RAM up to four megabytes.

To help you handle all this technology, we've added even more: a Blitter chip, capable of shifting data at high speeds independent of the CPU, and a new version of TOS.

The TOS 1.6 (operating system) has an enhanced file selector with drive-change buttons, improved desktop with file move, MS-DOS compatible disk formatting, and better application installation and auto-booting facilities.

As you'd expect, there's a huge range of peripherals including hard disks, floppy disks, laser printers, colour monitors and even Megafile 44, Atari's unique 44-megabyte removable hard disk.

As well as all this hardware, there are hundreds of software programmes for the 1040 STE - we're even throwing in the ST-Series Productivity and Leisure bundles free.

The Productivity bundle features a database, spreadsheet, word processor and business graphics package, and there's S.T.A.C., FirST BASIC, Hyperpaint and Prince in the Leisure bundle.

If you're itching to get your hands on the controls, there are two 15-pin analogue controller ports (which accept paddles, light-guns and light-pens) and a 9 pin mouse port and joystick port.

With adaptors, up to six people can use the 1040 at one time. Just in case it's too much for one person to handle.

At £499.99 it certainly won't be too much for one person to afford.

The ideal computer at the ideal price, you may think. We think so, too. But there remains only one potential problem: not whether you'll make impossible demands of the 1040, but whether the 1040 will make impossible demands of you.

Please send me further details of the 1040 STE and other Atari products.

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Please send to Atari Corp (UK) Ltd. Atari House,
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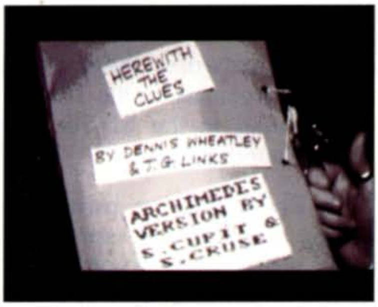
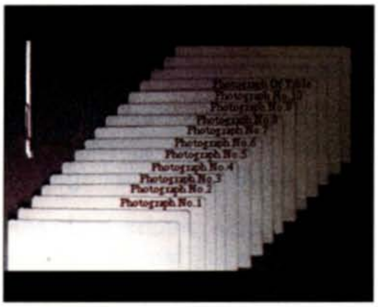
ATARI 1040STE

WITHOUT IT YOU'RE JUST PLAYING GAMES

HEREWITH


HEREWITH THE CLUES
BY DENNIS WHEATLEY & J.G. LINKS
ARCHIMEDES VERSION BY S. CUPIT & S. CRUSE


Photograph Of Table
Photograph No.10
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Photograph No.7
Photograph No.6
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Photograph No.4
Photograph No.3
Photograph No.2
Photograph No.1

SUPERIOR GOLF

Price: £19.95
Supplier: Superior Software. PO Box 6, Brigg, South Humberside DN20 9NH.
Tel: 0652 58585

I SUPPOSE it's inevitable that any software house which produces a golf simulation is expecting its product to be compared to similar ones, and I make no apology for comparing Superior Golf with that very fine golfing game, Holed Out.

The colourful loading screen offers three options, Play golf, Copy the courses supplied on to another disc or Create a courses file.

The latter two enable an enthusiast to build up a selection of homemade courses, or even create simulations of any golf course in the world provided you know the layout.

Because of copy protection, Superior have provided the course copying utility to enable only the courses to be copied and altered with the Hole editor or Course editor. Saving to the program disc is not permitted – and foolhardy!

If Play Golf is selected, the program lists a menu of six options, Play, Driving Range, Practice Green, Hole Editor, Course Editor and Quit. To select the desired option, click on it and the next stage appears.

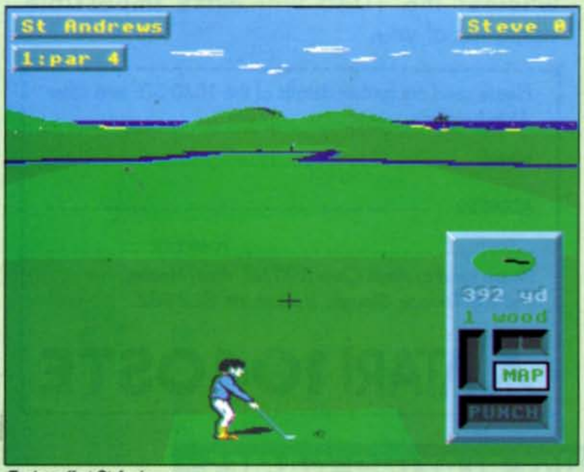
The driving range is a must for all players before tackling the actual courses, as controlling the club, both swing and hook or slice, is quite difficult, using the left – Select – mouse button only.

A small meter shows the power of the swing as you hold the mouse button down. When the button is released the ball is hit, but the mouse button must be clicked again to control the ball's direction. Click too soon and it is hooked to the left; too late it's a slice to the right.

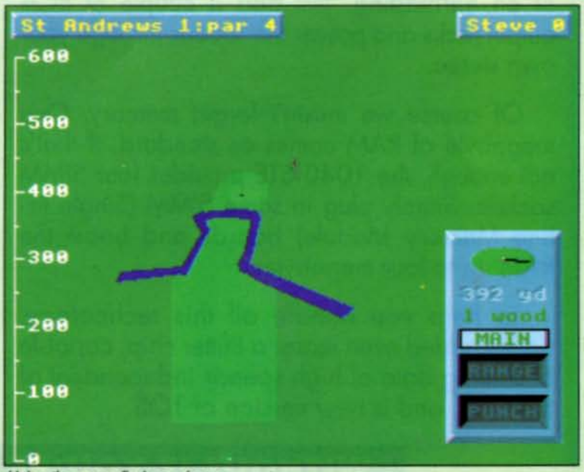
Despite being able to set the general direction for the shot – using the crosshair type of sight before swinging the club – the actual control is extremely difficult to master and requires lots of practice – it's like the real thing in this respect. There's a club selection menu and a useful range of stroke indicators for any particular club and power of swing, which all assist in getting to grips with the rudiments of golfing.

On to the courses: There's a choice of four at SeaPalms USA, St. Andrews, The Belfry and Victoria, Australia.

The things that struck me when I first entered the field of play were the deciduous trees, which incidentally can be altered at the first menu screen to show autumn, winter or summer foliage. They don't seem as realistic as the pines of Holed Out though. The rest of the graphics are pretty good and on


St Andrews
Steve 0
1:par 4
392 yd
1 wood
MAP
PUNCH

Teeing off at St Andrews


St Andrews 1:par 4
Steve 0
600
500
400
300
200
100
0
392 yd
1 wood
MAIN
RANGE
PUNCH

Using the range finder and map

... a hole in one

completing a round at St. Andrews, hopelessly over par, I was impressed with the small detail like the offshore oil rig.

I'm not about to produce the print out of my score card but you can – which is a nice touch – and I was quite proud when, at a par three, I actually managed to hole at par. I doubt whether I would ever become a member at the Royal and Ancient though.

By the time I'd completed the 18th hole I felt like the golfer on screen who looks as though he has been out on the greens all night.

There are good sound effects when the club is swung, the ball plops in the water, hits a tree or the green pin, and after lots of practice the game grows on you.

Golf is a game of skill and Superior Golf requires a fair bit of expertise to become reasonably proficient. Holed Out is easier to play initially, but Superior Golf could well be the better game in the long term.

It's pretty good value for money and you can design your own courses for ever more. I would say if you've bought Holed Out stay with it, if not, go for Superior Golf, but keep your patience while you learn to hit the ball.

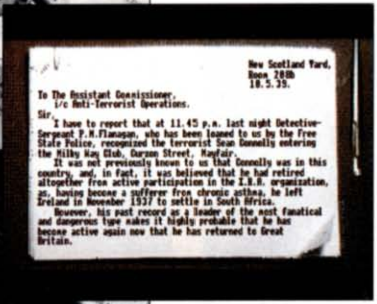
Baz Racon

Graphics	*8*
Sound	*8*
Playability	*9*
Value for money	*10*
Overall	*9*

THE CLUES

RU
LLER
NG HERE
IGHT
CARLTON CINEMA
8.30
Royal Circle
B 20
T. OVERHEAR

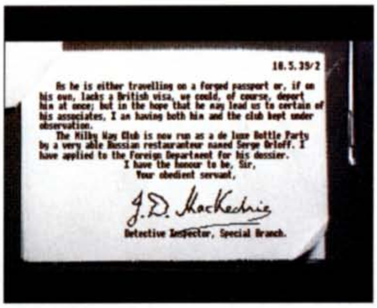
... give me the facts, man



New Scotland Yard,
Room 288b
10.5.39.

To The Assistant Commissioner,
i/c Anti-Terrorist Operations.

Sir,
I have to report that at 11.45 p.m. last night Detective-Sergeant P.M.Flanagan, who has been loaned to us by the Free State Police, recognized the terrorist Sean Connelly entering the Milky Way Club, Curzon Street, Mayfair.
It was not previously known to us that Connelly was in this country, and, in fact, it was believed that he had retired altogether from active participation in the I.R.A. organization, as, having become a sufferer from chronic asthma, he left Ireland in November 1937 to settle in South Africa.
However, his past record as a leader of the most fanatical and dangerous type makes it highly probable that he has become active again now that he has returned to Great Britain.



10.5.39/2

As he is either travelling on a forged passport or, if on his own, lacks a British visa, we could, of course, deport him at once; but in the hope that he may lead us to certain of his associates, I am having both him and the club kept under observation.
The Milky Way Club is now run as a de luxe Bottle Party by a very able Russian restaurateur named Serge Orloff. I have applied to the Foreign Department for his dossier.
I have the honour to be, Sir,
Your obedient servant,
J.D. MacKechnie
Detective Inspector, Special Branch.

Price: £24.95
Supplier: CRL Group PLC, 7 Kings Yard, Carpenters Road, London E15 2HD
Tel: 081-533 2918
Requirements: BBC A3000 or Archimedes series

I'M not usually at a loss for words about where to categorise a computer game, but this time I felt the need for a Pimms No.1 to aid contemplation. Even then, all I came up with was Whodunnit.

Herewith the Clues is based on a collaboration between thriller writer Dennis Wheatley and a friend, Joe Links.

In the years immediately between the World Wars a number of crime dossiers were produced which challenged readers to name the guilty party. The dossiers provided all the information – clues and the like – needed to come up with a solution.

Now the same thing is possible for Archimedes owners – and what a good idea it is, particularly if you enjoy reading detective fiction. In its way, the implementation of Herewith the Clues is as good as that of Not a Penny More, Not a Penny Less was indescribably awful.

The package consists of two discs and a few extra items which lend atmosphere. The storyline is as topical today as it was when first produced – an IRA cell which operates in London's West End has been uncovered.

The anti-terrorist authorities are mounting an operation to break up the cell, securing as many convictions as possible. They've managed to get Detective-Sergeant Spigott appointed as doorman at the Milky Way Club in Mayfair. He soon learns that a meeting of the whole IRA cell – 16 members in all – is planned for the night of May 23, 1939.

Spigott got the job because the police were able to lean on Serge Orloff who owns the Milky Way. Orloff is an ex-Bolshevik with Trotskyite leanings who quite sensibly decided that the Soviet Union wasn't a healty place to inhabit once Stalin began his paranoid purges.

However, Orloff has been stupid enough to get involved in the drug scene. The IRA cell members have discovered this second secret and have forced Orloff to join them and allow them to use a secret room used to store drugs as a meeting place and cache for their weapons and explosives.

The threat of deportation to Mother Russia and a bullet in the back of the neck was enough to make Serge as co-operative as anyone could wish, though he rightly feared what the IRA cell would do if they discovered he was informing on them. Poor Serge is caught between a rock and a hard place.

Because they reckon this is no ordinary cell but probably the IRA Central Council for the UK mainland, the authorities decide to mount a raid on the Milky Way Club once all the members are present: It would be a fantastic coup. Only something goes horribly wrong.

The raid was timed for 1.10 am, but 15 minutes before a number of things happened which threw the whole operation into chaos. Two shots rang out, causing club customers to panic and start rushing out. Detective-Sergeant Spigott was trampled in the rush and knocked unconscious. Minutes after the shooting, a massive explosion occurred in the premises in Shepherds Market, where the secret room was located. As a result all the IRA men bar one escaped.

When police finally entered the club they found a body. Serge Orloff had been shot through the heart near the locked door to the secret room and the key was chained to his corpse.

All you have to do, dear friends, is decide who the murderer is: Simple, isn't it? The game provides all the clues and information needed and you have to sift and evaluate the information.

Several reports give a wealth of background information. There are brief dossiers on each of the cell members, a list of exhibits to examine and a set of photographs – black and white, of course – showing each person belonging to the cell and an extremely dead Serge Orloff.

All can be examined and mulled over by clicking the pointer – a magnifying glass – on the item you wish to see more closely. If it's a photograph or one of the exhibits you'll be told – in the best speech I've yet heard – *Please insert disc two.*

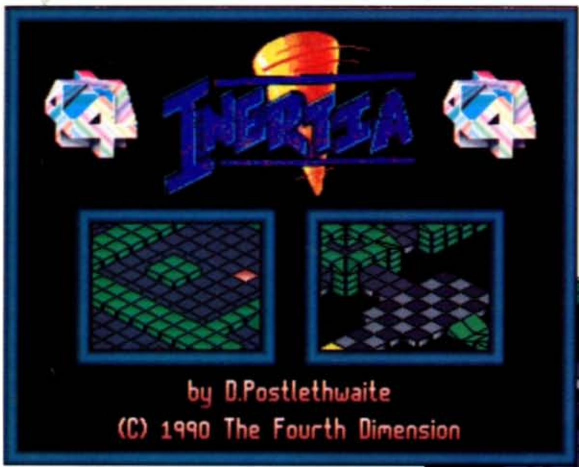
I've not come across anything quite so intriguing for a long time as Herewith the Clues, and if you enjoy a good detective puzzle with excellent atmosphere this is the game for you. I recommend it unreservedly.

Mad Hatter

Presentation	*8*
Atmosphere	*10*
Graphics	*9*
Value for money	*8*
Overall	*9*

INERTIA

... the new name for fascinating frustration



Choosing your landscape

Sound	10
Graphics	9
Playability	10
Value for money	9
Overall	9

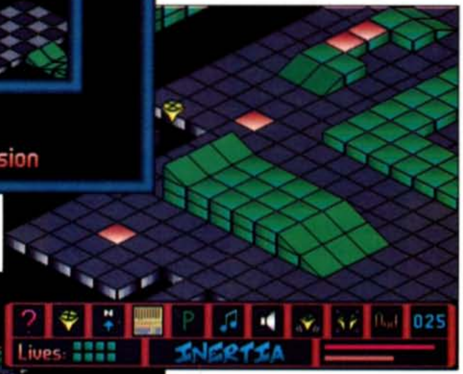
Price: £19.95
Supplier: The Fourth Dimension, 1 Percy Street, Sheffield S3 8 AU.
Tel: 0742 700661

THIS 3D game from Fourth Dimension is not for the short-tempered. The object seems simple – guide a yellow spinning top over a landscape consisting of coloured tiles. As you traverse the map, you must collect pink coloured tiles.

Easy it ain't. Using the Z, X, " and / keys you direct your top – or you can alter it to a ball – across two different landscapes against the clock.

Control is very tricky at first, and the spacebar – brakes – will often save you from slipping over the edge into oblivion and the loss of another life.

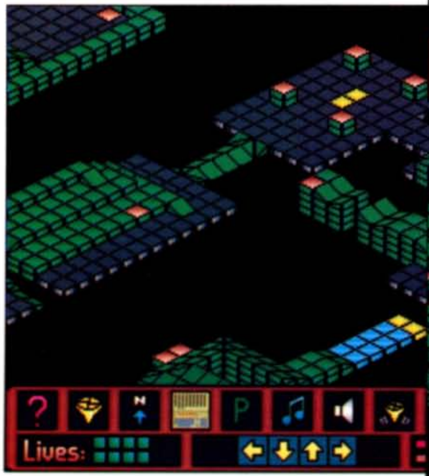
The difficulty and frustration starts immediately, but don't be put off, it's a game that will soon have you hooked. The urge is there to better your last miserable attempt, and the accompanying music is superb.



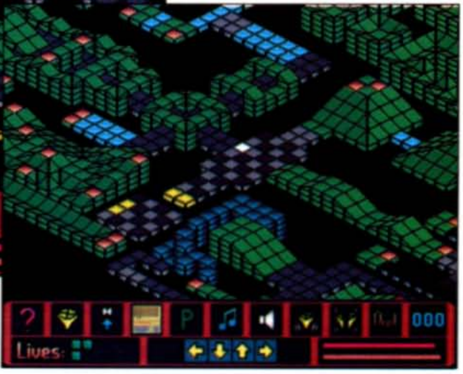
Making a jump

As you progress there are further obstacles in the form of ice tiles, over which you lose control, jump tiles which throw you into the air, brake tiles which prevent you stopping and vertical tiles which can only be traversed upwards.

Additionally, transformation tiles alter the handling characteristics and conveyor belts move you automatically.



Examining the scene



The landscape constantly changes as you progress, with bridges to pass under or over and ramps to negotiate.

Why this game is called Inertia beats me. The top is far from inert and the player isn't given any time to even consider being motionless in this totally absorbing puzzle.

The idea behind this game is not particularly original, yet it's absorbing and addictive and should lead to many hours of enjoyment.

Overall control is provided by an icon bar which covers help, craft alteration facilities, the map – which covers a massive area – and the usual pause and sound/music options are also available.

The graphics are particularly good and colourful, with only a slight pause as the screen scrolls. The two examples showing the map option of screen one and the playing area of screen two give a vivid insight into the treats in store.

For the price Inertia is another reasonably priced game for all ages. Highly recommended.

Baz Racon

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HOSTAGES

.. a shot right on target

PRICE £19.95
Supplier: Superior Software, PO Box 6, Brigg, South Humberside DN20 9NH.
Tel: 0652 58585
Requirements: BBC A3000 or Archimedes series

THE September issue of *The Micro User* contained a review of the BBC Micro and Electron versions of Superior's Hostages. The Archimedes version though has a number of enhancements – and not just in the graphics department.

The maze map shows clearly the positions of both terrorists and hostages and once a terrorist is shot he stays down. And, naturally enough, the graphics are a great deal better and smoother.

The Archimedes graphics and sound effects are really in a class of their own. The loading screen has moving images of near photographic quality and this continues right through the program.

Some of the sound effects are very realistic. The scream of anguish as an abseiler falls is truly heart rending.

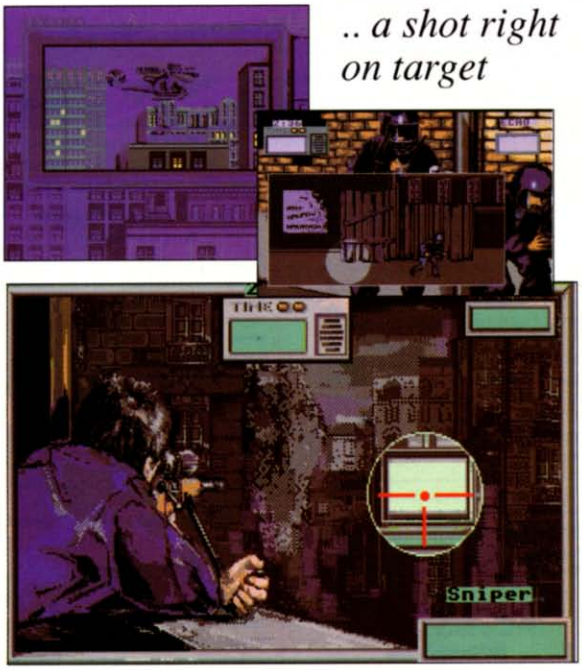
The gameplay is similar on all formats, but where the BBC Micro and Electron versions have a plan view of the building showing the position of the sniper and suitable places to hide the Archimedes version does not have a permanent map, but you can view it at almost any time by pressing the spacebar.

Stage two shows the brave commandos arriving by helicopter and then gives you the option of placing the three new members of the team at suitable positions.

Crashing a man through a window is a difficult task. First attempts will lead to many an early descent. It is all based on sound effects, and you have to release a key at the highest pitched note. Then if the positioning is right you get through. Good sounds and the mouse option makes this slightly easier on the Archimedes.

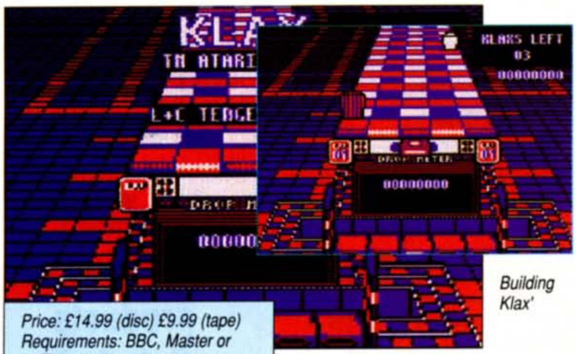
Rog Frost

Graphics	*10*
Sound	*10*
Playability	*9*
Value for money	*8*
Overall	*9*



KLAX

... a night on the tiles



Building Klax'

Price: £14.99 (disc) £9.99 (tape)
Requirements: BBC, Master or Electron
Supplier: Domark, 51-57 Lacey Road, London SW15 1PR.
Tel: 081-780 2222

EVERY so often the steady stream of zapping, kicking and jumping games is interrupted by a glimmer of originality, it happened with Tetris and now the experience is repeated with Klax.

If someone told you that you were about to spend much of your leisure time for the foreseeable future catching little coloured tiles and placing then in neat stacks, you'd probably think that they'd spent a touch too long in the sun.

You would, however, be completely wrong in your assumption, because tile stacking is the order of the day in this arcade blockbuster from Domark.

Running down the screen is a five lane conveyor belt along which tiles of differing colours are transported. At the end of each lane is a bin into which you must selectively flip tiles in an attempt to create vertical, horizontal, or diagonal lines of similar coloured tiles. A line of tiles is three units in length and is known as a Klax.

As each wave starts you are told of the number, and sometimes even the direction, of the Klaxes you need to create in order to proceed to the next wave.

Klax building is performed with the aid of a mobile paddle attached to the end of the conveyor. Using it you catch the on-coming tiles and then quickly move to the most appropriate bin and flip the tile. A bin can hold up to five tiles before it refuses to accept any more.

The duration of each game is determined by the number of tiles that fall off the edge of the conveyor, which happens if you are not quick enough with the paddle or if the bin that you have flipped a tile towards is already full.

A "Drop meter" tots up tiles dropped in the current game. Three dropped tiles and you're finished on the initial waves, building to an oh-so-generous five drops on higher levels.

Paddle operation is not quite as straightforward as it appears. Up to five tiles can be balanced on your paddle and tiles are flipped in last in–first out fashion into the bin of your choice.

As soon as a Klax has been created the appropriate tiles disappear, allowing the ones that they were supporting it to fall into new positions.

If these tiles create a new Klax you are immediately awarded points for this too. Clever planning, and an awesomely quick brain, will enable you to create high scoring Klax combinations.

Torrents of superlatives are frequently used to describe the latest offerings from the moguls of the computer world, but all too often the games don't live up to the hype.

Klax is different. Klax is described as "The fastest selling coin-op ever" and I would be tempted to believe them.

Jon Revis

Graphics	*7*
Sound	*6*
Playability	*10*
Value for money	*9*
Overall	*8*

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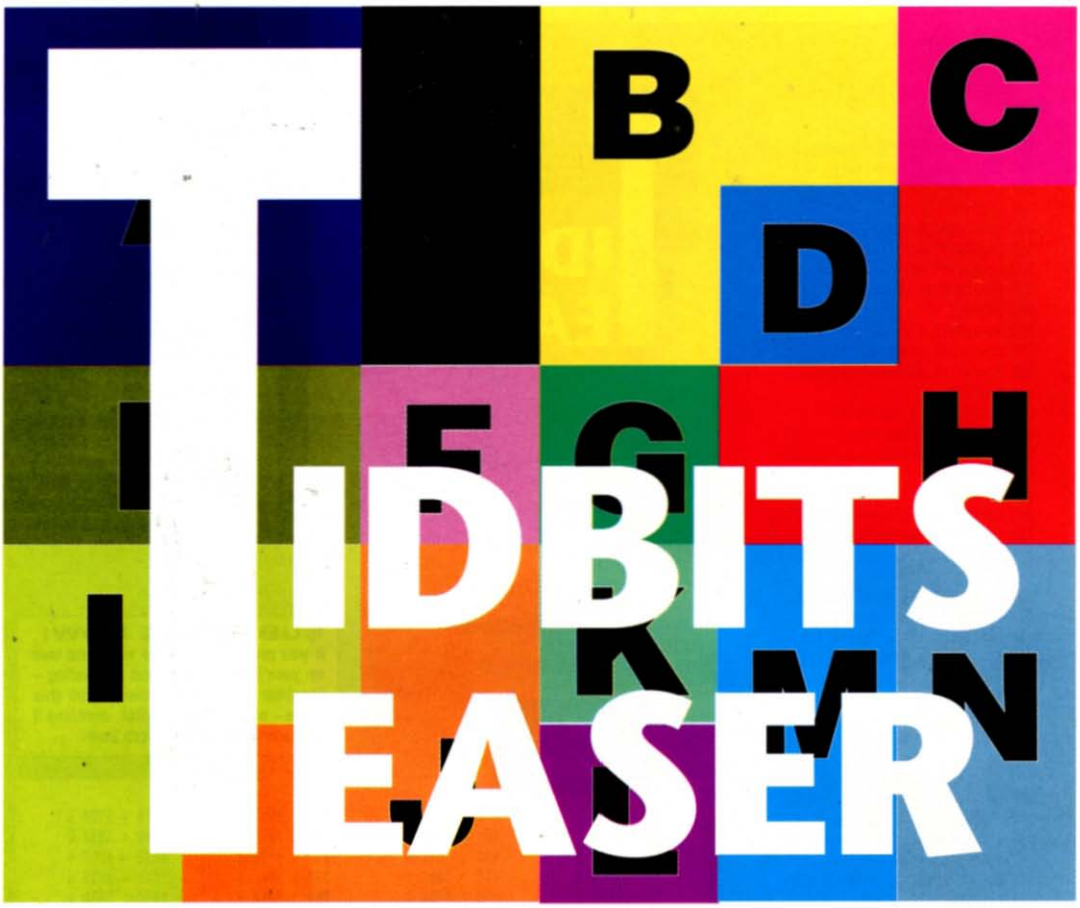

TIDBITS TEASER

Albert Gardner galvanises a 60–year–old puzzle into electronic life . . .

IN 1930 *Tidbits* magazine sold a wooden sliding-block puzzle called the "Tidbits Teaser" at a price of 6d, or 2.5p (not counting inflation), the prize for the first winning solution being the then princely sum of £850 – actually not a bad prize even nowadays.

The puzzle was unusual in that the blocks were of different shapes and sizes, and labelled with names of cars, such as Morris, Rover, Hillman and so on. The object was to move the large square labelled *My Car* from the top left corner, labelled *Office*, to the bottom right corner, labelled *Home*.

This computer version gives an oppotunity of seeing if you could have made your fortune back in 1930. Each piece is lettered, and to move a block simply type its letter. If the piece cannot move you will hear a beep.

If the piece can move in two different directions the computer will ask "Which way?", to which you answer U, D, L or R for Up, Down, Left or Right. However, if you move the same piece twice in succession it will not move back where it came from unless this is the only possible direction.

The program keeps a count of the moves you take, so if you manage it at all you can then try to do it again in fewer moves. Let us know how you get on.

```
   10 REM Tidbits Teaser
   20 REM by Albert Gardner
   30 REM (c) The Micro User
   40 *TV0,1
   50 MODE2
   60 PROCinit:W%=0
   70 REPEAT
   80 PROCget:PROCtest:PROCmove
   90 UNTILW%
  100 PROCwon
  110 END
  120 DEFPROCinit
  130 DIM x%(14),y%(14),z%(14)
  140 PROCassemble
  150 ?(subr+1)=start MOD256
  160 ?(subr+2)=start DIV256
  170 VDU 23;8202;0;0;0;
  180 VDU24,48;144;1232;976;
  190 GCOL0,134:CLG
  200 VDU24,56;152;1224;968;
  210 GCOL0,128:CLG
  220 FORQ%=0TO4:FORP%=0TO5
  230 READ?&76,?&77
  240 !&70=FNtop(P%,Q%)
  250 CALL code
  260 NEXT:NEXT
  270 ?(subr+1)=copy MOD256
  280 ?(subr+2)=copy DIV256
  290 VDU28,0,31,19,0
  300 PROCprint(2,4,7,4,"A"):PROCprint(1
1,4,0,3,"B"):PROCprint(17,4,7,5,"C"):PRO
Cprint(14,9,6,4,"D"):PROCprint(2,14,0,3,
"E"):PROCprint(8,14,5,7,"F"):PROCprint(1
1,14,0,2,"G"):PROCprint(17,14,7,1,"H")
  310 PROCprint(2,19,7,2,"I"):PROCprint(
8,24,1,3,"J"):PROCprint(11,19,7,2,"K"):P
ROCprint(11,24,4,5,"L"):PROCprint(14,19,
7,6,"M"):PROCprint(17,19,7,0,"N")
  320 FORI%=1TO14:READx%(I%),y%(I%),z%(I
%):NEXT
  330 T%=0:V%=-1:PROCnum
  340 ENDPROC
  350 DEFPROCprint(X%,Y%,f%,b%,A$)
  360 COLOURf%:COLOUR(128+b%)
  370 PRINTTAB(X%,Y%);A$;
  380 ENDPROC
  390 DATA 48,48,48,48,0,0,15,15,15,15
  400 DATA 51,51,48,48,48,48,0,0,15,15,2
4,36,3,3
  410 DATA 5,10,5,10,55,59,8,4,3,3,3,3
  420 DATA 12,12,12,12,7,11,28,44,61,62
  430 DATA 21,42,12,12,7,11,7,11,18,33,6
1,62,21,42
  440 DATA 0,0,2,3,0,5,5,0,1,4,1,1,0,2,4
,2,2,1,3,2,1,4,1,6,0,3,5,1,3,6,3,3,1,3,4
,1,4,3,3,5,3,3
  450 DEFPROCget
  460 REPEAT:S%=GETAND95-64
  470 UNTILS%>0ANDS%<15
  480 P%=x%(S%):Q%=y%(S%):Z%=z%(S%)
  490 ENDPROC
```

➤

```
500 DEFPROCtest
510 ONZ% GOTO520,550,600,640,680,730
520 U%=FNU(P%,Q%):D%=FND(P%,Q%)
530 L%=FNL(P%,Q%):R%=FNR(P%,Q%)
540 ENDPROC
550 U%=FNU(P%,Q%)ANDFNU(P%+1,Q%)
560 D%=FND(P%,Q%+1)ANDFND(P%+1,Q%+1)
570 L%=FNL(P%,Q%)ANDFNL(P%,Q%+1)
580 R%=FNR(P%+1,Q%)ANDFNR(P%+1,Q%+1)
590 ENDPROC
600 U%=FNU(P%,Q%):D%=FND(P%,Q%+1)
610 L%=FNL(P%,Q%)ANDFNL(P%,Q%+1)
620 R%=FNR(P%,Q%)ANDFNR(P%,Q%+1)
630 ENDPROC
640 U%=FNU(P%,Q%)ANDFNU(P%+1,Q%)
650 D%=FND(P%,Q%)ANDFND(P%+1,Q%)
660 L%=FNL(P%,Q%):R%=FNR(P%+1,Q%)
670 ENDPROC
680 U%=FNU(P%,Q%)ANDFNU(P%+1,Q%)
690 D%=FND(P%+1,Q%)ANDFND(P%,Q%+1)
700 L%=FNL(P%,Q%)ANDFNL(P%,Q%+1)
710 R%=FNR(P%+1,Q%)ANDFNR(P%,Q%+1)
720 ENDPROC
730 U%=FNU(P%+1,Q%)ANDFNU(P%,Q%+1)
740 D%=FND(P%,Q%+1)ANDFND(P%+1,Q%+1)
750 L%=FNL(P%,Q%+1)ANDFNL(P%+1,Q%)
760 R%=FNR(P%+1,Q%)ANDFNR(P%+1,Q%+1)
770 ENDPROC
780 DEFPROCmove
790 B%=U%+D%+L%+R%
800 IFB%=0 VDU7:ENDPROC
810 IFB%<-1 PROCquery
820 M%=P%+L%-R%:N%=Q%+U%-D%
830 IF U%ORL% PROCUL ELSE PROCDR
840 SOUND0,-10,5,1:PROCnum
850 x%(S%)=M%:y%(S%)=N%:T%=S%
860 u%=1+D%:d%=1+U%:l%=1+R%:r%=1+L%
870 W%=(S%=2 AND M%=4 AND N%=3)
880 ENDPROC
890 DEFPROCUL
900 IFZ%<6 PROCmovebox(0,0)
910 IFZ%=1 ENDPROC
920 IFZ%<>3 PROCmovebox(1,0)
930 IFZ%<>4 PROCmovebox(0,1)
940 IFZ%=2ORZ%=6 PROCmovebox(1,1)
950 ENDPROC
960 DEFPROCDR
970 IFZ%=1 GOTO1010
980 IFZ%=2ORZ%=6 PROCmovebox(1,1)
990 IFZ%<>4 PROCmovebox(0,1)
1000 IFZ%<>3 PROCmovebox(1,0)
1010 IFZ%<6 PROCmovebox(0,0)
1020 ENDPROC
1030 DEFPROCmovebox(a%,b%)
1040 !&70=FNtop(P%+a%,Q%+b%)
1050 !&72=FNtop(M%+a%,N%+b%)
1060 CALL code
1070 ENDPROC
1080 DEFPROCquery
1090 IFS%=T% U%=u%*U%:D%=d%*D%:L%=l%*L%
:R%=r%*R%:ENDPROC
1100 VDU28,0,31,15,29:PRINT"Which Way?"
1110 REPEAT:A%=INSTR("UDLR",CHR$(GETAND
95)):UNTILA%:CLS
1120 IFA%=1ANDU% D%=0:L%=0:R%=0:ENDPROC
1130 IFA%=2ANDD% L%=0:R%=0:GOTO1180
1140 IFA%=3ANDL% R%=0:GOTO1170
1150 IFR%=0 VDU7:GOTO1100
1160 L%=0
1170 D%=0
1180 U%=0
1190 ENDPROC
1200 DEFPROCnum
1210 VDU28,16,31,19,29:V%=V%+1
1220 PRINTTAB(2+(V%>9)+(V%>99),0);V%;
```

B
C
D
H
N
TIDBITS
TEASER

```
1230 ENDPROC
1240 DEFPROCwon
1250 VDU28,0,31,15,29:PRINT"Home at las
t in moves"
1260 ENDPROC
1270 DEFFNtop(P%,Q%)
1280 =&3520+P%*&60+Q%*&C80
1290 DEFFNU(P%,Q%)
1300 =(?(FNtop(P%,Q%)-636)=0)
1310 DEFFND(P%,Q%)
1320 =(?(FNtop(P%,Q%)+3202)=0)
1330 DEFFNL(P%,Q%)
1340 =(?(FNtop(P%,Q%)-1)=0)
1350 DEFFNR(P%,Q%)
1360 =(?(FNtop(P%,Q%)+104)=0)
1370 DEFPROCassemble
1380 DIM code 72
1390 FORpass=0TO2STEP2
1400 P%=code
1410 [OPT pass
1420 LDA&70:CLC:ADC#&80:LDA&71:ADC#&C:S
TA&74
1430 .lp LDY#&5F:.subr JSR&00
1440 LDA&72:CLC:ADC#&80:STA&72:LDA&73:A
DC#&2:STA&73
1450 LDA&70:CLC:ADC#&80:STA&70:LDA&71:A
DC#&2:STA&71:CMP&74:BNElp
1460 RTS
1470 .start LDA&77:STA(&70),Y:DEY:LDA&7
6:STA(&70),Y:DEY:BPLstart
1480 RTS
1490 .copy LDA(&70),Y:STA(&72),Y:LDA#0:
STA(&70),Y:DEY:BPL copy
1500 RTS
1510 ]
1520 NEXT
1530 ENDPROC
```

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```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = DDC0 0
  50 = DA59 E
  60 = 517E B
  70 = BFBA 2
  80 = B7A2 A
  90 = 42EC 1
 100 = B9C1 6
 110 = FD2E 6
 120 = 344C D
 130 = DDBA E
 140 = 126A 1
 150 = E9A6 9
 160 = CB6B C
 170 = 6D88 B
 180 = 9D3F D
 190 = 1F12 4
 200 = 170B 9
 210 = 1CC7 6
 220 = 4E3C B
 230 = 6A63 4
 240 = D2FC B
 250 = AF58 B
 260 = 24BD 2
 270 = 2F7D B
 280 = C78A 7
 290 = 5D3A E
 300 = A811 E
 310 = 1162 B
 320 = 6D22 2
 330 = 793B 7
 340 = ED0F 2
 350 = 5E1F C
 360 = 1C22 0
 370 = F230 A
 380 = ED0F D
 390 = 8780 0
 400 = 730F 9
 410 = FC25 C
 420 = B236 B
 430 =  D35 4
 440 = 38BC C
 450 = B08A 8
 460 =  BC4 B
 470 = 5BD6 4
 480 = 6743 D
 490 = ED0F E
 500 =  A24 1
 510 = FD51 A
 520 = 7A86 5
 530 = 3C48 2
 540 = ED0F C
 550 = 417E B
 560 = 635C 2
 570 = 3E42 E
 580 = 6893 F
 590 = ED0F 9
 600 = FB53 E
 610 = 3E42 4
 620 = A200 3
 630 = ED0F 9
 640 = 417E B
 650 = 931D E
 660 = 962F C
 670 = ED0F B
 680 = 417E 1
 690 = F592 A
 700 = 3E42 4
 710 = 6D73 0
 720 = ED0F D
 730 = 15E4 3
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 750 = 8568 0
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 840 = 9A2F 1
 850 = 3BEB 9
 860 = 46B5 5
 870 = D9EF 0
 880 = ED0F 3
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 910 = D0C1 0
 920 = 90E1 4
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 960 = A708 6
 970 = 854B 0
 980 =  9A3 6
 990 = ADF3 0
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1250 = 38BD A
1260 = ED0F A
1270 = 7E10 8
1280 = 247E 0
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1300 = 4EE3 1
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1450 = 2E23 C
1460 = 9843 C
1470 =  222 9
1480 = 9843 9
1490 = 8C1F 3
1500 = 9843 5
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1530 = ED0F 4
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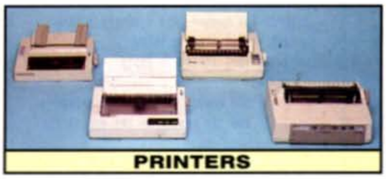

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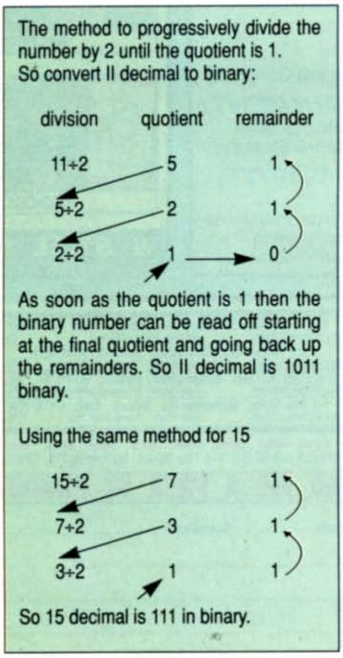
Say
No to
better
mouse
traps

Binary

THEY say that if you build a better mousetrap the world will come rushing to your door. Well they might, but if you manage it don't think you'll get congratulations from those who've built earlier versions. Grudging respect is about the best you'll get – and you won't even get that from me.

What's brought about this ungenerous mood is nothing to do with mousetraps but everything to do with programming and one program in particular.

For reasons best known to myself, I wanted a little conversion routine to take a normal decimal integer, say 23, and convert it into its binary representation, 10111. I wasn't going to use the binary number for anything else, so all I really wanted was a binary string that I could display onscreen. If I was going to do any maths with the numbers, I may as well do it in the decimal both I and Basic understand. Afterwards my routine could convert the result to the binary needed for the display.


The method to progressively divide the number by 2 until the quotient is 1.
So convert II decimal to binary:

division	quotient	remainder
11÷2	5	1
5÷2	2	1
2÷2	1	0

As soon as the quotient is 1 then the binary number can be read off starting at the final quotient and going back up the remainders. So II decimal is 1011 binary.

Using the same method for 15

division	quotient	remainder
15÷2	7	1
7÷2	3	1
3÷2	1	1

So 15 decimal is 111 in binary.

Figure I: Converting to Binary

Apparently kids nowadays are brought up counting in all sorts of bases, unlike old duffers like me who just learnt base ten numbers. Hence my counting on ten fingers as opposed to the two-fingered approach adopted by my younger friends. So it was off to the library to borrow a maths book that showed how to convert decimal to binary.

The method I came up with was to repeatedly divide the decimal number by 2, collecting successive remainders to make up the final binary number. Figure I shows how it's done while Program I shows how I've used the method, PROCprocessNumber being the one that actually does the work. It may be a bit longwinded and fairly un-mugtrapped but I've gone for clarity rather than brevity. The pseudocode in Figure II shows the design lurking behind the program.

```
 10 REM Program I
    20 PROCgetNumber
    30 PROCprocessNumber
    40 PROCprintBinary
    50 END
    60 DEF PROCgetNumber
    70 INPUT number
    80 IF number<1 THEN PROCgetNum
ber
    90 ENDPROC
   100 DEF PROCprocessNumber
   110 finished=FALSE:binaryString$=""
   120 REPEAT
   130 IF number<2 THEN binaryStri
ng$=binaryString$+STR$(number):fini
shed=TRUE ELSE binaryString$=binary
String$+STR$(number MOD 2):number=n
umber DIV 2
   140 UNTIL finished
   150 ENDPROC
   160 DEF PROCprintBinary
   170 PRINT binaryString$
   180 ENDPROC
```

```
get a decimal number
process the number into a binary string
printout the result

   get a decimal number
      take number from keyboard
      if number is less than one then
         get a decimal number

   process the number into a binary string
      set finish flag to false
      set binary string to empty
      repeat
         if the number is less than 2 then
            add the number to the end of the
string
            set finished to true
         else
            divide by 2
            add the remainder to the end of
the string
            set number to the dividend
      until finished
```

Figure II: Pseudocode for Program I

So there I was with a working program, my metaphorical mousetrap. And all was well until I let my nephew Nigel see the program. I think that what got him going was when I mentioned that I'd used recursion in PROCgetNumber. If you hadn't noticed it, take a look at line 80 which repeatedly calls PROCgetNumber from inside itself if *number* is less than one.

Now Nigel knows recursion backwards (noisrucer) why which was I'd pointed it out. I wish I hadn't bothered because his only reaction was to wonder why I'd used recur-

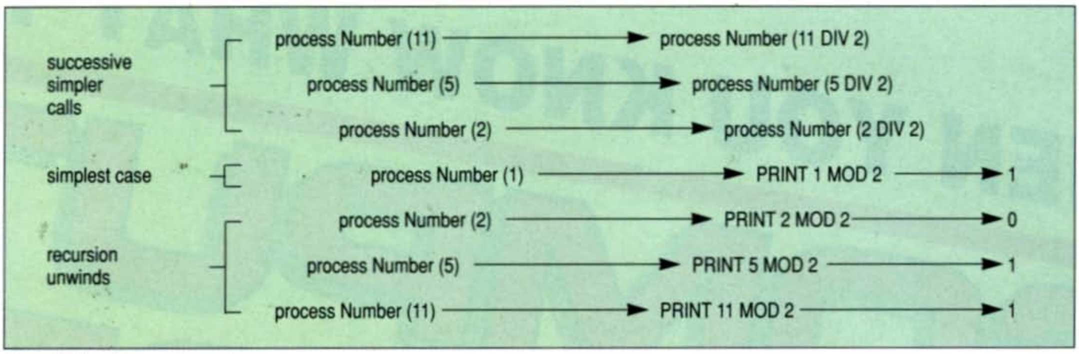


Figure IV: How the recursion works

battleground

sion for such a trivial task and ignored it when it came to converting decimal to binary. He then went on to show exactly what he meant by converting my Program I to Program II. The peudocode of Figure III shows the scheme behind the listing.

```
    10 REM Program II
    20 PROCgetNumber
    30 PROCprocessNumber(number)
    40 PRINT
    50 END
    60 DEF PROCgetNumber
    70 INPUT number
    80 IF number<1 THEN PROCgetNumber
    90 ENDPROC
   100 DEF PROCprocessNumber(number)
   110 IF number>1 THEN PROCprocessNum
ber(number DIV 2)
   120 PRINT; (number MOD 2);
   130 ENDPROC
```

```
get a decimal number
print out the binary equivalent of number

 get a decimal number
       take number from keyboard
       if number is less than one then
          get a decimal number

 print out the binary equivalent of number
    if the number is greater than one then
       print out the binary equivalent of num-
ber divided by two
    print out the remainder when number is
divided by two
```

Figure III:Pseudocode for Program II

Looking at the new version of PROCprocessNumber, I've got to admit – grudgingly – that it's a lot neater. And, although it's well hidden, it even uses the same method as my program except now it's implemented using recursion.

Put briefly recursion works by dividing a complex problem into successively simpler versions of the same problem until a very simple case, for which an answer is known, is found. Using this result, you then work backwards solving each problem in turn from the simplest to the original, most complex one. Figure IV shows how it works in this case.

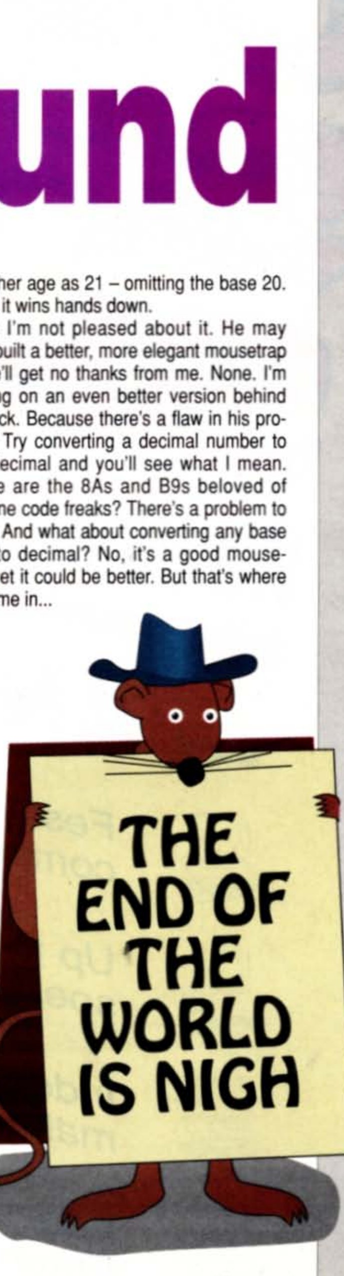
But while this is another of our metaphorical mousetraps, is it a better one? I admit it uses recursion and even a procedure with a parameter but while this may bring programming brownie points, is it better?

Well, it's certainly shorter and more elegant but really it just does the same job only rather more obscurely. So, if that was all there was to it, I'd say that they were about the same. But, having said that, I think Program III settles the issue in favour of Nigel's recursion.

```
    10 REM Program III
    20 PROCgetNumberBase
    30 PROCprocessNumber(number,base)
    40 PRINT
    50 END
    60 DEF PROCgetNumberBase
    70 INPUT "Enter number followed by
 base " number,base
    80 IF number<1 OR base<2 THEN PROC
getNumberBase
    90 ENDPROC
   100 DEF PROCprocessNumber(number,ba
se)
   110 IF number>(base-1) THEN PROCpro
cessNumber(number DIV base, base)
   120 PRINT; (number MOD base);
   130 ENDPROC
```

Not content with just converting from decimal to binary, Program III will convert from decimal to any base – the pseudocode is practically the same as that for Program II so I'll leave it to you to figure out. After using it a 41 year-old I know now gives her age as 21 – omitting the base 20. I think it wins hands down.

But I'm not pleased about it. He may have built a better, more elegant mousetrap but he'll get no thanks from me. None. I'm working on an even better version behind his back. Because there's a flaw in his program. Try converting a decimal number to hexadecimal and you'll see what I mean. Where are the 8As and B9s beloved of machine code freaks? There's a problem to solve. And what about converting any base back to decimal? No, it's a good mousetrap, yet it could be better. But that's where we came in...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Steve Bruntlett looks over a new slide presentation package

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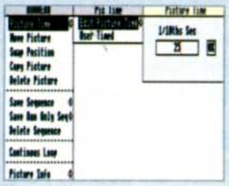
The fully Risc OS compatible software is described as *a program that turns your computer into an electronic projector and enables you to consecutively display a number of full screen sprites.*

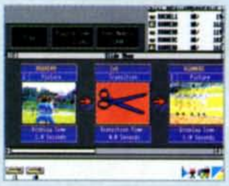


Timing the picture

Loading is a simple a matter of clicking on the !Slideshow icon in the Filer window and when selected from the icon bar the main window displays panels for Play, Playing time and Free memory across the top and a normal window containing three areas into which you can drop Mode 12 and/or Mode 15 sprites.

The latter are required to have the same palette, which in general they do anyway, while Mode 12 sprite palettes may vary. The length of display for each picture is under user control, as is the method of fade between one and the next, though the fade duration can't be changed.

Unfortunately while there are 27 fades to choose from you have to alter each individually from the default, which could take a very long time on a big slideshow.



Controlling the fade

Operation is simplicity itself and there is rarely any need to refer to the manual – in fact the only time I did so was to find out if the program could load compressed Pro-Artisan screens. It won't, and this is the program's main drawback but something which the author is working on. The software ought to be able to handle all the major file types, including compressed ones.

At present you have to load compacted Pro-Artisan screens back into Pro-Artisan and resave them in standard sprite format, which at 160k each soon gobbles up disc space.

!Slideshow compresses screens as you load them and displays the reduced size of the current one as well as the size of the whole sequence. While it is more suited to a hard disc system, you can cram quite a lot of pictures into one sequence.

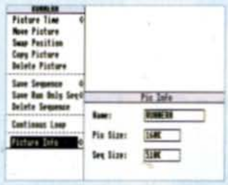
For example I put together a slideshow of 18 Artisan 2 pictures (18x80k=1.4Mb)

➤

➤

which came to a file size of 787k for the whole sequence which will fit on to a standard floppy disc – certainly good news.

I also created a series of 10 Pro-Artisan screens on one disc, though I had to decompress them and the resave as full sprite screens before loading them into !Slideshow – is a bit of a long-winded procedure.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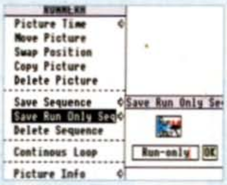
Seq Size:

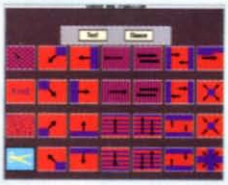
Picture information is provided

Sequences can be save as a single file which can be run from the !Slideshow program or alternatively they can be saved as a run-only file, which means that the loading and display instructions are contained within it allowing it to be run on any machine without having to have the !Slideshow program. This is a good idea with many applications.

I've used !Slideshow with several student-teachers who have compiled displays of computer images on a hard disc system without problems. The run-only sequences are an excellent way of reviewing course work unaided, as they can be run independently by clicking on a student-named icon in a hard disc directory.


RUNNER
Picture Time
Move Picture
Swap Position
Copy Picture
Delete Picture
Save Sequence
Save Run Only Seq
Delete Sequence
Continuous Loop
Picture Info
Save Run Only Se
Run-only
OK

Creating a run-only file



Choosing a fade

I had no problems saving the sequence by itself, but when saving as a run-only file it is easier to use a ram disc set at 800k if you have the memory. The file is saved in a couple of seconds allowing you to transfer the whole application to a blank formatted disc in one go.

Summing up

The program is excellent and well worth the asking price for presentations using Mode 12 and 15 screens. I couldn't find anything else like it for putting together graphic screen displays, though more sophisticated – and expensive – packages may be available.

This is a straightforward utility and, with improvements in file handling, is a good place to start if you want to display graphics screens in this way.

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Logo lowdown

Mike Bibby revels in the logic of this fascinating educational language

HOW many intelligent, capable and, supposedly, well-educated people have you met who claim they're just no good at maths and could never do sums at school? A few certainly, perhaps even you...

Nowadays, of course, the modern child has calculators to help with the purely mechanical sums. But no calculator can help a child understand the power and potential beauty of mathematics. Nor will it provide the confidence and expertise to create and explore mathematical ideas and problems.

Seymour Papert, the renowned Swiss educationalist and mathematician, has a word for those who go blank at the mere mention of Maths: Mathophobes. But he hasn't just named it, he's given us a cure in the form of an innovative and extremely simple language called Logo – a language which even has its own special creature: The turtle.

Papert based his work on the ideas of child psychologist Piaget: Children don't learn by being passive vessels waiting to be crammed full of facts. They learn by exploring, investigating and experimenting.

Until Papert came along most computer-assisted learning (CAL) involved cramming facts via a narrow programmed course, leaving little room for discovery or insight. The computer was programming the child, so Papert decided it was time for the roles to be reversed: Children would learn by programming – and the tool would be Logo.

He used the idea of a child learning its first language. Immersed in it from birth, the child communicates with increasing ease and fluency and from there goes on to use this mastery to learn further subjects and skills.

So Papert had two goals for Logo:

- It had to be so easy to learn that communication with the micro becomes natural and fluent.
- Once liberated by this free-flowing communication, Logo then had to be flexible enough to allow exploration of the whole field of learning.

Someone who learns Logo isn't just learning a programming language, but a complete way of thinking.

At its simplest, Logo allows you to control the movements of an object – a turtle. In its earliest form, and often today, the turtle is a mechanical beastie that crawls across the floor, dragging a pen. More often it's on the computer display. Either way, Logo treats them in the same way. You control the movements of the turtle with commands like FORWARD, BACK, LEFT and RIGHT. You can add the distance you want it to travel and whether you want its pen to be down – in order to draw a line – or up.

Those that inhabit the computer screen quite happily leave multi-coloured lines like aerobatic teams with smoke trails. Children take immediate advantage of them to create their own stunning displays.

Right from the start the child is in control and the turtle follows orders precisely. There's no attitude problem with teachers and no petty restrictions on curiosity. All that's required is to give the turtle orders in an entirely natural – but basically mathematical – way.

It's here that the child's imagination takes over. To paraphrase Papert, the turtle becomes a tool for thinking. One successful bit of "turtling" leads to another, and then another, and so on ... ideas and concepts being spawned and tested at a remarkable rate.

Listening to a class of children exposed for the first time to the open-ended possibilities of Logo is an amazing experience. It's as if mathematics has suddenly changed from monochrome to full colour.

Straight away the turtle is used to create patterns – involving lots of planning and calculation, because things must be done in the right sequence to produce the right effect.

Also the ideas of repetition – "If we do this four times we get a zig-zag" – and procedures – "Let's teach the turtle to do all this when we type SQUARE" – begin to emerge naturally from the child's own curiosity.

Similarly variables enter the picture easily: "Let's fix SQUARE so that it draws different sizes of squares depending on the number we give it".

Sequence, repetition, procedures and variables: These are all fundamental concepts of programming languages that emerge spontaneously from experimentation. And because Logo now becomes the child's own fluent, natural language, they inevitably go on to use their new skills throughout the whole of the learning process.

There's much more to Logo than pretty pictures of course. Derived as it is from the artificial lintelligence language Lisp, it has some far more powerful capabilities such as being able to process a whole list of items with just one command.

But it's the turtle graphics that make the most vivid and immediate impression. I was lucky: School maths was easy for me and I went on to become a mathematician. But what always puzzled me was why others couldn't see the beautiful patterns involved in the number work we were doing.

Now, thanks to the work of Seymour Papert, they can.

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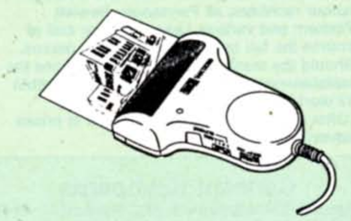

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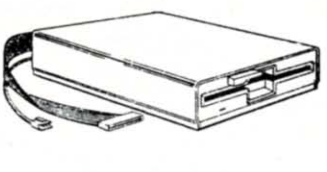

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(Offer applicable only when bought at prices advertised in this advert).

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

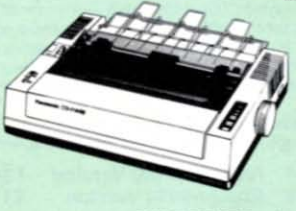
Roland Plotters

(Official Roland Appointed Distributor)

● **DPX 2500**	£2435	● **DXY 1100**	£545
● **DXY 1200**	£715	● **DXY 1300**	£925

Panasonic KX-P1081

12
MONTHS
FREE
MAINTENANCE
ON SITE



SALE OFFER only: **£125**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every KX-P1081 printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £134

Panasonic Printers

● **KX-P1124** 24pin 80col. 192/63 CPS	£195
● **KX-P1540** 24pin 136col. 240/80 CPS	£390
● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£345
● **KX-P1624** 24pin 132col. 192/63 CPS	£318
● **KX-P1640**	£349
● **KX-P1695** 9pin 132col. 330/86 CPS	£320
● **KX-P4420** NEW 8PPM Laser	£949

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592	£32	**P19** P1124/1180	£55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110	for KX-P1081, 1592 & 1595	£8
P115	for KX-P1180	£8
P145	for KX-P1124	£8
P140	for KX-P1540	£10

Colour Ribbons for KX-P1081, 1592 & 1595
Brown, Blue or Red **£9.95 each**

NEC Pinwriter Printers

● P2+ 24 pin 80 col 168/56 cps 8K Buffer			£209
● P6+ 24 pin 80 col 216/72 cps 26 fonts			£319
● P7+ 24 pin 136 col 1216/72 cps 26 fonts			£379
● P6 Ribbon	£8	● P7 Ribbon	£10
● Colour option	£74	● Serial Interface	£73
● Cut Sheet Feeder			£125

INTEGREX COLOUR JET

● Colour Jet 132 Printer	£515
● Paper Roll	£6.50
● Screen Dump Software	£10
● Colour Cartridge	£19.50
● Colour Textile Cartridge	£29
● Black Cartridge	£11.25
● Black Textile Cartridge	£17
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£123

Citizen Printer

120D Plus	£105	Swift 9	£198
Prodot 9	£275	Prodot 24	£275
Swift 24	£245		
Swift 24 Colour Option			£34
Swift 24 Colour Ribbons			£13

Hewlett-Packard Printers

HP Desk Jet +	£475	HP Desk Writer	£620
HP Thinkjet	£250	HP Paint Jet Colour	£676
HP Scan Jet +	£1199	HP Quiet Jet Plus	£415
HP Desk Jet Cartridge			£14

Star Printers

● LC10 9pin 80col. 144/36 CPS	£119
● LC10 Colour 9pin 80col. 144/36 CPS	£158
● LC10-II 9PIN 80col. 180/45 CPS	£145
● LC15 9pin 136col. 180/45 CPS	£250
● LC24-10 24pin 80col. 180/60 CPS	£185
● LC24-15 24pin 136col. 200/67 CPS	£315
● XB24-10 24pin 80col. 240/80 CPS	£379
● XB24-15 24pin 80col. 240/80 CPS	£489
● XB-24 Colour Kit	£35

Star Accessories

Cut Sheet Feeder

LC10/LC24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

SPC-10	LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15	£49
8K Ser	FR10; FR15; XB24-10; XB24-15	£64

BUFFERS

32K Ram Card for LC24-10 & 15	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15 Black	£4
LC10 Colour Ribbon	£6
XB24-10 & XB24-15 Black	£5
XB24-10 & XB24-15 Colour	£12

LASER PRINTERS

Canon LBP-4		£849
Canon LBP-8 III		£1375
Canon LBP-8 IIIT		£1739
Canon LBP-8 IIIR		£1869
Epson GQ5000	6ppm	£860
HP Laserjet IIP	4ppm	£735
HP Laserjet IID	8ppm	£1820
HP Laserjet III	8ppm	£1199
Panasonic KX-P4420	8ppm	£840
Panasonic KX-P4450i	11ppm	£1185
Qume Crystal Print WP+		£759
Qume Crystal Print Ser. 2		£1069
Qume Crystal Print Postscript		£1979
Star LP-8 II		£1099
Star LP-8 II 2 Bin		£1535
Star LP-8 Star(post)script		£1575

Laser Toners

Canon 2	£60	Laserjet II	£79
Canon 4	£70	Laserjet IIP	£79
Epson GQ	£20	Panasonic	£29
Star	£–	Qume Crystal	£25

Laser RAM Upgrades

HP Laserjet II RAM		GQ5000 512k		£99
Jetware II 1MB	£175	KX-P4420	1M	£249
Jetware II 2MB	£330	KX-P4450i	1M	£299
Jetware IIP 1MB	£199	KX-P4450i	2M	£575
Jetware IIP 2MB	£319			

Epson Printers

EX800	**£410**	LQ1050	**£540**
EX1000	**£540**	LQ1060	**£649**
FX850	**£299**	LQ2550+	**£760**
FX1050	**£370**	LX400	**£129**
FX1060	**£679**	LX850	**£179**
LQ400	**£185**	SQ850	**£515**
LQ850	**£439**	SQ2550	**£789**
LQ550	**£269**	TLQ4800	**£1449**
LQ860 Colour	**£535**		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	**£130**
FX1000/LQ1000/1050	**£175**
LQ2550	**£390**
LX400/800/850/LQ400/500/550	**£69**

TRACTOR FEED for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

ACCESSORIES

● EX800/1000 Colour Option	**£45**
● EX800/1000 Colour Ribbon	**£14**
● LQ2500 Colour Option	**£65**
● Multifont Card for LQ550/850/1050	**£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	**£32**	RS232 + 2K Buffer	**£52**
IEEE 488	**£40**	RS232 + 8K Buffer	**£79**

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 6'	£6
IBM Parallel Lead 5 meters	£13
IBM Parallel Lead 10 meters	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Important Notice to All our Customers

Watford Electronics only supplies products fitted with British Specification 240V AC Mains 3 core cable with connections for Live, Neutral and Earth. We do not sell, nor intend to supply grey imports from Europe with incorrect 220V European mains connections (2 core cable!) which could be dangerous to the end user.

MEGABUFFER 256

CLEAR
STATUS EMPTY FULL

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Universal Printer Sharers/Changer

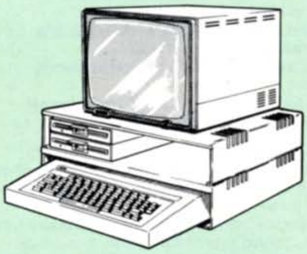
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£32	£–	£4

(Cables extra at £6 each. Please specify type required when ordering)

Plinths for BBC Micro, Master & Printer



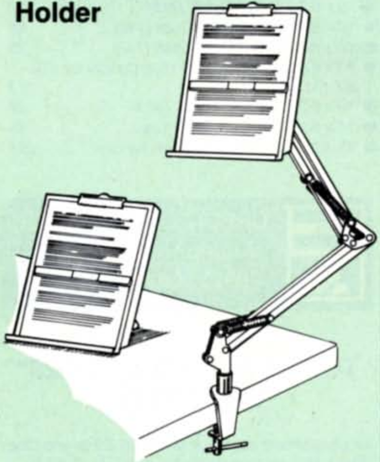
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Printer Plinth	420 x 310 x 105mm **£12**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£21
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

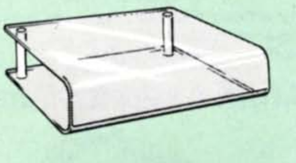
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	**£5.00**
1,000 90 x 36mm (Twin Row)	**£4.90**
1,000 90 x 49mm (Twin Row)	**£7.50**
1,000 102 x 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand

The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)
132 Column version £28 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	**Ribbons**	**Dust Covers**
Brother HR15/20	**£3.50**	**–**
BBC Micro	**–**	**£3.50**
BBC Master	**–**	**£4.00**
Archimedes Micro pair	**–**	**£9.00**
Citizen 120D	**£3.95**	**£4.50**
DMP2000	**£3.75**	**£4.75**
EX/LQ800	**£4.50**	**£4.50**
EX/LQ1000	**£6.75**	**£5.00**
RX/FX80/85/800/MX80	**£3.25**	**–**
FX/MX/RX100/1000	**£5.00**	**–**
Kaga/Taxan KP810/815	**£4.90**	**£5.00**
LQ500/550/800/850	**£4.50**	**£6.00**
LQ1050/LQ2500	**£7.00**	**–**
LX80/86/800/850	**£3.25**	**£4.50**
M1009/GLP	**£3.80**	**£3.75**
NEC P2200	**£6.00**	**£5.00**
Panasonic KX1080/81	**£3.50**	**£4.75**
Panasonic KX-1124	**£8.00**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star LC10/NL10	**£4.25**	**£5.00**
Star LC24-10	**£5.00**	**£6.00**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser

Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic). (FREE this month, PC Mouse Drivers & Art package) (Now, fully LinCAD compatible. Recommended by Linear Graphic). (FREE this month, PC Mouse Drivers & Art package)

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	£16.00
● Watford DFS Kit complete	£69.00
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
● DFS Manual (comprehensive)	£6.95
● Acorn DNFS ROM	£17.00
● Acorn ADFS ROM only	£25.00
● Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

● SPECIAL PRICE	£44.00
● DDFS Manual	(No VAT) £6.95
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	£30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40T (744)*	*£5*
● *10 x 5.25" D/S D/D 40T (745)*	*£7*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£8*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£9*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£13*
● *10 x 3.25" S/S D/D 40/80 Track*	*£9*
● *10 x 3.25" D/S D/D 40/80 Track*	*£8*
● *10 x 3.5" Double Sided High Density*	*£18*

VISA
Access

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

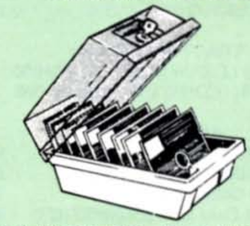
● *10 x **M3** 3.5" D/S D/D 80 Track*	*£8*
● *10 x **M9** 3.5" D/S High Density*	*£17*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£7*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£8*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£13*
● ***M2** 3" Double Sided*	*£3 each*

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

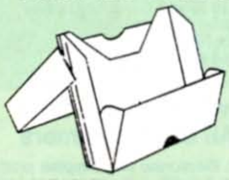


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	£4.95
● **M85** – holds up to 95 5.25" discs	£6.95
● **M25*** – holds up to 25 3.5" discs	£4.95
● **M50** – holds 50 3.5" discs	£6.50
● **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. **Only £2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

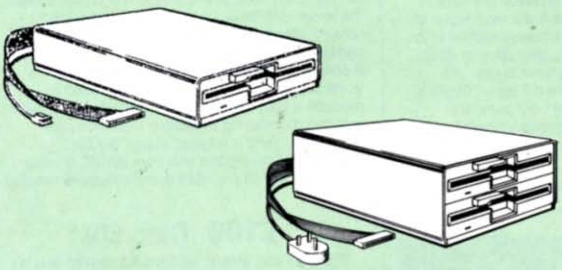
BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£30	£35	£40
● With Sleeves	£33	£38	£43

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.*** *We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £6 to £7

Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Refurbished Disc Drives now available

CLS400 £50; CLD800 £98; CS400 £59; CD800 £115

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

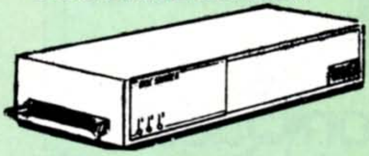
- **CLS35 400K Unit £65**
- **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

- **CS35 Single 400K £85**
- **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

DISC DRIVE SHARER



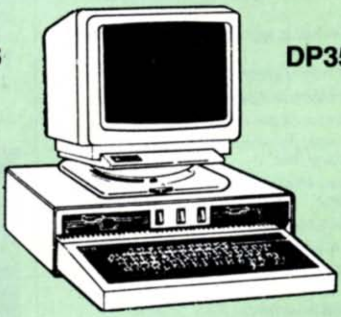
(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : **£55** Price includes 3 Cables

CDPM 800S

DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST
MOUSE Mk II

Quest Mouse II & Quest Paint	£58
Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
Quest Mouse II only	£29
Quest Paint Software only	£34
Quest Font Disc (22 Text Fonts)	£15
Quest Mouse Mat (Red or Blue or Green please specify)	£3
Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

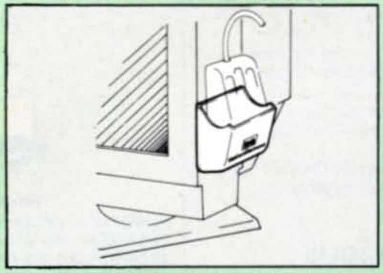
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it. A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

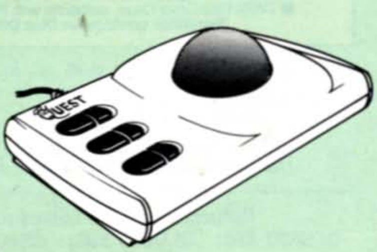
(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

NEW

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10	BBC/Master Version	**£32**
QT-20	Archimedes Version	**£35**

WAPPING
EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc;

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

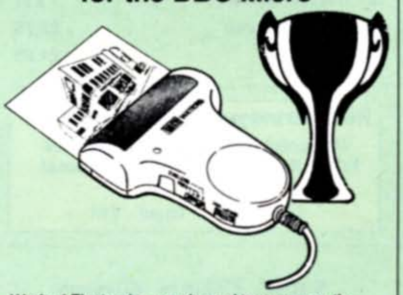
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware	**£135**

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Laser Direct

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/ envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £875

(For demonstration, call in at our retail shop)

NEW

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

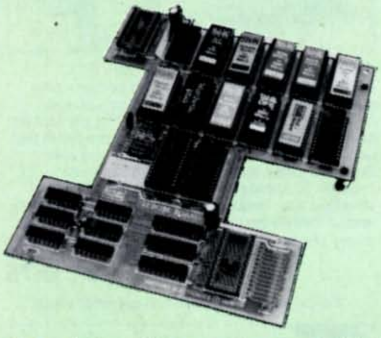
(Please write in for technical literature)

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

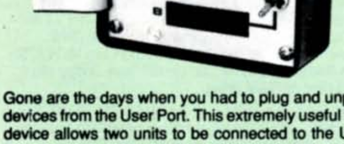
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System

ESCAPE
TAB
CAPS LOCK

Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.75**
● Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

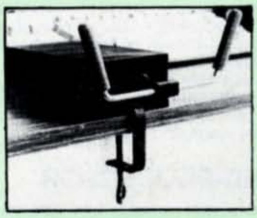
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

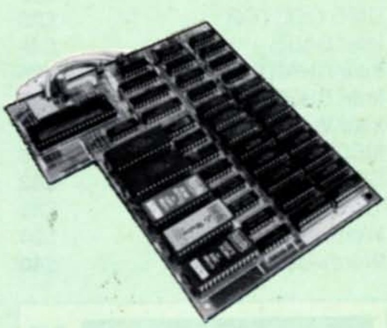
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	£48
● ROM/RAM card with 64k dynamic RAM	£65
● ROM/RAM card with a massive 128k dynamic RAM	£109

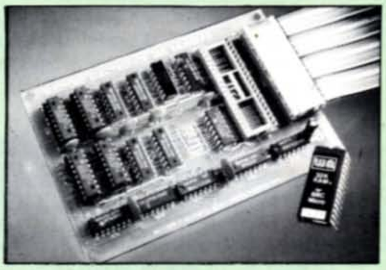
(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	£9
● 16k Dynamic RAM for Upgrade	£13
● Battery backup	£3
● Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

● Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

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(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

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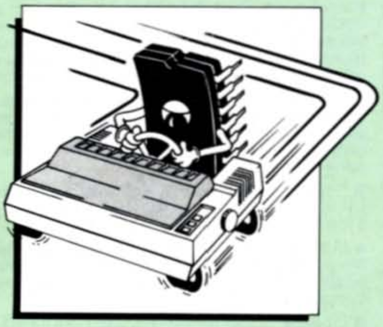
VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

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Wordwise plus **£40**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL – Uses and abuses of computers.

HARDWARE – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

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Only: **£14.95** (Book No VAT)

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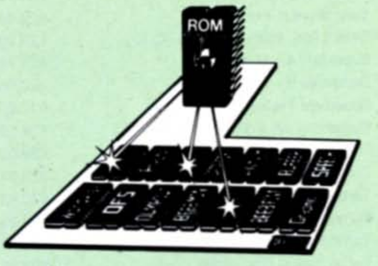
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs . Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs", (BEEBUG November '84.)

ONLY £20

ADDER

The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!
The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£32**(carr £3)
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- Spare UV tubes. **£12**

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This 415MI, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

£2.50

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Ideal for cleaning and preventing static build-up on TV/ Monitor Screens.

£2.50

Aerosol Dust Spray

This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

SPARES for BBC Micro

BBC Refurbished Keyboard	£46	Speaker	£3
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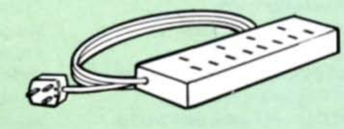
Replacement Flexible 17 way Keyboard Connector			£4

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

£9.50 (carr £1.50)

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£13.50 (carr, £1.50)

ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL HEADER PLUG

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

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(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
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Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK **£8**

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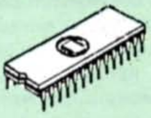

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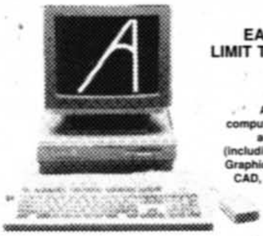

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THE MICRO USER

Harry Wall shows how to create utility roms the easy way

Ram bank security

MANY utilities can format programs into a bank of sideways ram. The disadvantage is that when accessed these programs are put back into main ram before being run – wasting many of the advantages of the ram bank system. SRBuild solves this problem and more.

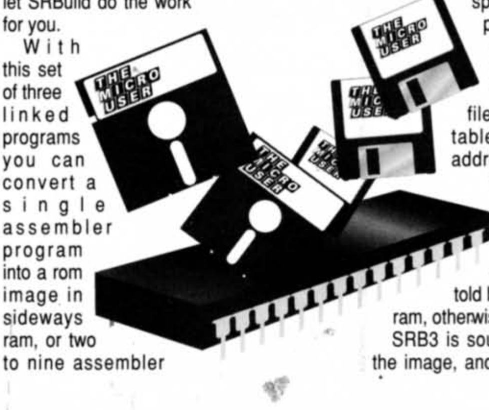
Until now the only other solution was to re-write the programs to run from sideways ram, and this requires additional understanding of how roms need to be written.

Now you can have the best of both worlds: You can write or copy machine code routines that work in main memory and have them run from sideways ram without them being moved first.

To build a set of machine code programs into a sideways ram bank means in essence, assembling a header, calculating the start of each program, assembling it at this address and finally creating a menu for calling the programs.

All this is time consuming and by no means straightforward. A better way is to let SRBuild do the work for you.

With this set of three linked programs you can convert a single assembler program into a rom image in sideways ram, or two to nine assembler programs, depending on their length, into a rom image with a menu in sideways ram.



You only need to make four standard alterations to each of your source programs and then run them through SRBuild. This means you can now get the full benefits of sideways ram without having to learn and get involved in the complexities of sideways ram programming.

How it works

When SRBuild is running it asks for the file name and the star command which will later be used to activate the sideways ram image. The header, the code for printing the menu, and the code for manipulating the table of file names and addresses – which will be added later – are assembled and moved to sideways ram bank five, which is where the rom image will be built. Program SRB2> is then loaded and called.

SRB2> asks for the first file name and this source program is loaded. *O%* is set to *TOP* and *P%* to the first free space in sideways ram. The program is run and the resulting machine code moved to sideways ram. This is repeated for each file, and while in progress a table of file names and start addresses is built up which is then moved to sideways ram.

Finally you are asked if you want the image saved or not. If not, you are told how to activate the sideways ram, otherwise program SRB3 is loaded.

SRB3 is source code for *SRSAVEing the image, and it saves from 8000 to the end of your last program. It is run to generate the machine code and then called. Although the image is built in bank five, it can be subsequently *SRLOADed into any bank.

As the main ram is used extensively during execution, SRBuild has to be in machine code. Although the source code is inevitably rather long, it produces fast and compact machine code – 24k available for each of your source code programs its resultant machine code and 15.25k in sideways ram for your programs – see Figure I. The programs are packed tightly, so no space is wasted.

Before converting your source programs, make sure they are thoroughly debugged. When you are satisfied they work properly, the four mandatory modifications can be made. They can be explained with reference to Listing IV and should be exactly as written:

Line 40 Reserves space for the heap and must be the first instruction.

Line 50 If you wish to see the code assembling, change to:

```
FOR pass%=4 TO 7 STEP 3
```

Line 60 This initiates the offset assembly process. The actual addresses are supplied by the program.

Line 210 This instruction causes a jump back from ram into SRB2> after assembly so that there is no break in continuity – it must be the last Basic instruction.

The source code must, of course, comply with the rules for any program using offset assembly. For example, if *P%* is altered

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at any point *O%* must be altered to match as in line 90.

Direct calls cannot be made to the Basic rom in the normal way because it uses the same address range as sideways ram, and any call will automatically go to sideways ram. This difficulty can be overcome by using extended vectors.

An easy way to implement this is to add Listing V to the end of your source code making sure that variable names and line numbers do not clash. All you now have to do is make your calls in the form OPT FNxxx(<address>). For example, where you would type JSR &BD6C from ram you would type OPT FNxxx(&BD6C) from sideways ram.

Type Listings I and II saving them as SRBuild and SRB2 respectively – use the checksums to ensure you've made no errors. Now run SRB2 to produce the code SRB2> which is saved automatically. Type Listing III, check it and save as SRB3.

After preparing your source programs as described above, copy them to the disc holding the SRBuild set. CHAIN "SRBuild" and simply follow the prompts as they are shown on screen. When the rom image has been saved to disc, the way to use it is to type:

```
*SRLOAD <file name> 8000 <id>
```

then Return. Replace *id* with the number of the sideways ram bank number you wish to use. To initialise it press Control+Break. To use one of the utilities you've loaded just issue the sar command that you specified when creating the rom image.

When entering the file name of a source program you may get the error message *Not found or Syntax error.* If the message comes before the *Assembling code* message, you have entered an incorrect file name but you have the chance to enter the correct one.

If the error message comes after the *Assembling code* message and you have done the initial debugging properly, there is a syntax error related to the offset assembly stage. You will have to abort the run to find it.

It is advisable to put each of your source programs through SRBuild individually before making them into a set. Any errors can then be dealt with and there should be no problems when the final build is made.

And that's about all there is. You can now take your own assember programs and those you have copied from magazines and books, convert them to rom images and get the full benefit of sideways ram with very little trouble. You'll find sideways ram the ideal place for your utility programs.

Listing I

```
  10 REM SRBUILD - Listing I
  20 REM by H.R.Wall
  30 REM (c) The Micro.User
  40 MODE135:LOMEM=&7400
  50 table=&8200
  60 CLS
  70 VDU131:INPUT"ROM file name "RN$
  80 IF LEN RN$>17 THEN 90 ELSE 100
  90 VDU129:PRINT"Too long"':GOTO70
 100 $&900=RN$
 110 VDU131:INPUT"ROM * name    "SN$
 120 PROCheader
 130 OSCLI("*SRWRITE 5000+1FF 8000 5")
 140 OSCLI("*LOAD SRB2>"):CALL&6F00
 150 END
 160 DEF PROCheader
 170 FORpass%=4 TO 6 STEP 2
 180 P%=&8000:O%=&5000
 190 [OPT pass%
 200 EQUB 0
 210 EQUW 0
 220 JMP service
 230 EQUB &82
 240 EQUB offset MOD 256
 250 EQUB 1
 260 .helpname
 270 EQUS RN$  \ *HELP name
 280 EQUB 0
 290 .offset
 300 EQUB 0
 310 EQUS "(C)"
 320 EQUB 0
 330 .service
 340 PHA
 350 CMP #9
 360 BEQ help
 370 CMP #4
 380 BEQ nothelp
 390 PLA
 400 RTS
 410 .help
 420 PHY
 430 PHX
 440 JSR prtitle
 450 PLX
 460 PLY
 470 PLA
 480 RTS
 490 .prtitle
 500 JSR &FFE7
 510 LDX #&FF
 520 .loop
 530 INX
 540 LDA helpname,X
 550 JSR &FFE3
 560 BNE loop
 570 JSR &FFE7
 580 RTS
 590 .nothelp
 600 PHY
 610 PHX
 620 LDX #&FF
 630 DEY
 640 .starloop
 650 INX
 660 INY
 670 LDA (&F2),Y
 680 AND #&DF
 690 CMP star,X
 700 BEQ starloop
 710 LDA star,X
 720 BPL notclaimed
 730 CMP #&FF
 740 BNE notclaimed
 750 JMP menu
 760 .notclaimed
 770 PLX
 780 PLY
 790 PLA
 800 RTS
 810 .star
 820 EQUS SN$       \ STAR name
 830 EQUB &FF
 840 EQUB 0
 850 .claimed
 860 PLX
 870 PLY
 880 PLA
 890 LDA #0
 900 RTS
 910 .menu
 920 LDX #201:LDA table,X
 930 CMP #1:BNE menu2
 940 JSR &8300:JMP claimed
 950 .menu2
 960 LDA #12:JSR &FFEE
 970 LDX #2:LDA #1:STA &7F
 980 LDA #134:JSR &FFEE
 990 LDA #48:STA &82
1000 .nextline
1010 JSR &FFEE:LDA #46:JSR &FFEE
1020 LDA #&20:JSR &FFEE
1030 PHX:JSR prtext:LDX #201
1040 LDA table,X:CMP &7F
1050 BEQ cont
1060 PLX:INC &7F:TXA:CLC:ADC #20
1070 TAX:INC &82:JSR &FFE7
1080 LDA #134:JSR &FFEE
1090 LDA &82:JMP nextline
1100 .cont
1110 PLX
1120 JSR &FFE7:JSR &FFE7
1130 LDA #134:JSR &FFEE
1140 INC &82:LDA &82:JSR &FFEE
1150 LDA #46:JSR &FFEE
1160 LDA #&20:JSR &FFEE
1170 LDA #134:JSR &FFEE
1180 LDX #(text2-text):JSR prtext2
1190 JSR &FFE7:JSR &FFE7
1200 .cont2
1210 LDA #131:JSR &FFEE
1220 LDX #(text1-text):JSR prtext2
1230 JSR &FFE7
1240 JSR &FFE0:SEC:SBC #&30
1250 LDX #201:CMP table,X:BEQ over
1260 BCS cont2
1270 STA &83
1280 LDX #0:LDY #0
1290 .findadd
1300 CPY &83:BEQ found
1310 TXA:CLC:ADC #20:TAX
1320 INY:JMP findadd
1330 .found
1340 LDA table,X:STA dummy+1:INX
1350 LDA table,X:STA dummy+2
1360 LDA #12:JSR &FFEE
1370 .dummy
1380 EQUB &20
1390 EQUW 0
1400 .again
1410 JSR &FFE7:JSR &FFE7
1420 LDA #130:JSR &FFEE
1430 LDX #(text3-text):JSR prtext2
1440 JSR &FFE7
1450 .again2
1460 JSR &FFE0
1470 CMP #78:BEQ over
1480 CMP #89:BNE again2
1490 JMP menu
1500 .over
1510 JMP claimed
1520 .prtext
1530 LDA #134:JSR &FFEE
1540 .prt2
1550 LDA table,X:CMP #13:BEQ rts
1560 JSR &FFEE:INX:BRA prt2
```

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```
1570 .rts RTS
1580 .text
1590 .text1 EQUS "Type number reqd. "
1600 EQUB 0
1610 .text2 EQUS "Return to Basic"
1620 EQUB 0
1630 .text3
1640 EQUS "Another program ? Y/N "
1650 EQUB 0
1660 .prtext2
1670 LDA text,X:BEQ rts2:JSR &FFEE
1680 INX:BRA prtext2
1690 .rts2
1700 RTS
1710 ]
1720 NEXT
1730 ENDPROC
```

Get it right ✓

```
  10 =    0 0 |  590 = F62A 0 | 1170 = 1868 0
  20 =    0 0 |  600 = 1177 6 | 1180 = B9A6 C
  30 =    0 0 |  610 =  156 0 | 1190 = EC57 4
  40 = BA56 6 |  620 = 99B3 2 | 1200 = 9D7F 7
  50 = 33A0 3 |  630 = F888 D | 1210 = 9166 0
  60 = 7A16 9 |  640 = 6ED1 9 | 1220 = CBA6 0
  70 = F98D D |  650 = 7602 E | 1230 = 9B98 3
  80 = EF61 3 |  660 = 6623 D | 1240 = 3DD4 C
  90 = E89B 5 |  670 = 6F7F E | 1250 = 2ACD 4
 100 = FE77 2 |  680 = AD6A 9 | 1260 = 88D2 D
 110 = E1E6 B |  690 = 7929 4 | 1270 = 763D E
 120 = E56D 2 |  700 = 821E B | 1280 = F48E F
 130 = 3F6D 7 |  710 = 9723 F | 1290 = E27C 1
 140 = 8D1F E |  720 = 7A20 8 | 1300 = E6FD F
 150 = FD2E C |  730 = 66FF E | 1310 = 4FEB F
 160 = 73A3 E |  740 = F078 8 | 1320 = E26F C
 170 =  4A9 E |  750 = 3EB2 3 | 1330 = DB31 F
 180 = 8598 E |  760 = 737F 6 | 1340 = C993 8
 190 = 95CD 9 |  770 = CD92 0 | 1350 = 6F47 3
 200 = 1C74 E |  780 = DDB3 9 | 1360 = B2F7 8
 210 = B4E7 1 |  790 = 4E8A 3 | 1370 = 90B3 0
 220 = D015 9 |  800 = 9843 6 | 1380 = DC6A E
 230 = 13E3 8 |  810 = 7CB3 B | 1390 = B4E7 6
 240 = C50A 7 |  820 = 58F0 0 | 1400 = 9E58 D
 250 =  C55 C |  830 =  6A6 9 | 1410 = EC57 C
 260 = D28F 7 |  840 = 1C74 E | 1420 = 492F D
 270 = 365C D |  850 = C2F5 4 | 1430 = 67B9 1
 280 = 1C74 E |  860 = CD92 0 | 1440 = 9B98 0
 290 = 27E3 3 |  870 = DDB3 D | 1450 = 2C66 8
 300 = 1C74 6 |  880 = 4E8A 6 | 1460 = EB7F C
 310 = D1B0 C |  890 =  295 4 | 1470 = 70EB 0
 320 = 1C74 F |  900 = 9843 3 | 1480 = D9A6 E
 330 = FEEA 9 |  910 = D1C4 0 | 1490 = 3EB2 6
 340 = 824E C |  920 = 91B9 3 | 1500 = 8A82 9
 350 = 93D0 5 |  930 = 35F6 3 | 1510 = EC0A 8
 360 = 7CE7 2 |  940 = 9DFD 1 | 1520 =  71B 6
 370 = 427D D |  950 =  94D 7 | 1530 = 1868 E
 380 = DB33 B |  960 = B2F7 E | 1540 = E18D 1
 390 = 4E8A C |  970 = C3B2 3 | 1550 = AE92 E
 400 = 9843 2 |  980 = 1868 4 | 1560 = 4A4F 7
 410 = 5B46 8 |  990 = 8F98 B | 1570 = 1E9F E
 420 = 1177 2 | 1000 = D6FD B | 1580 = 80E0 3
 430 =  156 8 | 1010 = 5B75 1 | 1590 = 5C42 2
 440 = A297 A | 1020 = 96E6 B | 1600 = 1C74 1
 450 = CD92 E | 1030 = C2BD 4 | 1610 = C18A 6
 460 = DDB3 1 | 1040 =  3C4 D | 1620 = 1C74 E
 470 = 4E8A 0 | 1050 = 83DF 9 | 1630 = 77B8 D
 480 = 9843 2 | 1060 = 4FDB 5 | 1640 = FD40 B
 490 = E76D 1 | 1070 = E6AB 2 | 1650 = 1C74 E
 500 = 9B98 1 | 1080 = 1868 0 | 1660 = 7DF6 D
 510 = 99B3 C | 1090 = E140 A | 1670 = F5A2 5
 520 =  325 0 | 1100 = A47E D | 1680 = E0F2 D
 530 = 7602 D | 1110 = CD92 3 | 1690 = 27D2 C
 540 = 6417 3 | 1120 = EC57 1 | 1700 = 9843 4
 550 = DB1C 1 | 1130 = 1868 9 | 1710 = 8B58 5
 560 = 738E 8 | 1140 = E9E1 F | 1720 = 2C83 A
 570 = 9B98 A | 1150 = ED11 2 | 1730 = ED0F 8
 580 = 9843 D | 1160 = 96E6 2 |
```

Listing II

```
10 REM SRB2 - Listing II
20 REM by H.R.Wall
30 REM (c) The Micro User
40 PROCassemble
50 OSCLI("*SAVE SRB2> 6F00+4F0"):END
60 DEF PROCassemble
70 FOR N%=0 TO 3 STEP 3
80 P%=&6F00
90 [OPT N%
100 .init
110 LDA &202:STA &8A
120 LDA &203:STA &8B
130 LDA #error MOD 256:STA &202
140 LDA #error DIV 256:STA &203
150 STZ &70:STZ table
160 LDA #&83:STA &71
170 STA table+1
180 STZ &72:STZ &73
190 STZ &76:STZ &77
200 LDA #restart MOD 256:STA &78
210 LDA #12:JSR &FFEE
220 LDA #restart DIV 256:STA &79
230 STZ &7A:STZ &7B
240 LDA #2:STA &7D:STZ &7E
250 LDA #5:STA param+7
260 LDA #restart2 MOD 256:STA &86
270 LDA #restart2 DIV 256:STA &87
280 STZ &88:STZ &89
290 .start
300 LDA #131:JSR &FFEE
310 LDX #(text1-text):JSR prtext
320 JSR &FFE0:CMP #&3A:BCC start2
330 JSR &FFE7
340 LDA #129:JSR &FFEE
350 LDX #(text5-text):JSR prtext
360 JSR &FFE7:JSR &FFE7:JMP start
370 .start2
380 JSR &FFEE:SEC:SBC #&30:STA &7C
390 LDX #201:LDA &7C:STA table,X
```

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```
400 JSR &FFE7:JMP enterfiles
410 .error
420 LDA #129:JSR &FFEE
430 LDX #(text6-text):JSR prtext
440 JSR &FFE7:JSR &FFE7
450 .enterfiles
460 LDA #131:JSR &FFEE
470 LDX #(text2-text):JSR prtext
480 JSR tableaddress
490 JSR osword0
500 JSR insertfname
510 LDA &70:STA param+8
520 LDA &71:STA param+9
530 JMP processcode
540 .repeat
550 INC &7E
560 LDA &7E:CMP &7C:BEQ rts2
570 LDA &7D:CLC:ADC #20:STA &7D
580 LDX &7D:DEX:DEX:LDA &80:STA table,
X
590 INX:LDA &81:STA table,X
600 JSR bytesfree
610 JMP enterfiles
620 .rts2
630 JSR movetable
640 JSR &FFE7
650 LDA #131:JSR &FFEE
660 LDX #(text3-text):JSR prtext
670 .save2
680 JSR &FFE0:CMP #89:BEQ save
690 CMP #78:BEQ save3
700 JMP save2
710 .save3
720 JSR &FFEE:JSR &FFE7:JSR &FFE7
730 LDA #130:JSR &FFEE
740 LDX #(text4-text):JSR prtext
750 JSR &FFE7:LDA #130:JSR &FFEE
760 LDX #(text4A-text):JSR prtext
770 JSR &FFE7
780 RTS
790 .save
800 JSR &FFEE
810 LDX #record MOD 256
820 LDY #record DIV 256
830 JSR &FFF7
840 JSR &8F18
850 .restart2
860 LDA &8A:STA &202
870 LDA &8B:STA &203
880 JSR &6E00
890 RTS
900 .record
910 EQUS "LOAD SRB3"
920 EQUB 13
930 .processcode
940 JSR move
950 JSR findtop
960 LDA &8C:STA &74
970 LDA &8D:STA &75
980 LDA #133:JSR &FFEE
990 LDX #(text10-text):JSR prtext
1000 JSR &FFE7
1010 LDA #15:JSR &FFEE
1020 JSR &8F18
1030 .restart
1040 LDA &441:CMP #&BF:BCS full
1050 LDA &440:CMP #&FF:BCC store
1060 .full
1070 LDA #129:JSR &FFEE
1080 LDX #(text8-text):JSR prtext
1090 LDA &7E:STA &7C
1100 LDX #201:LDA &7C
1110 STA table,X
1120 JMP rts2
1130 .store
1140 LDA &440:STA &80
1150 LDA &441:STA &81
1160 JSR blocklen
1170 JSR nextprog
1180 LDA &74:STA param+1
1190 LDA &75:STA param+2
1200 JSR transfer
1210 JMP repeat
1220 .move
1230 LDX #execute MOD 256
1240 LDY #execute DIV 256
1250 JSR &FFF7
```

➤

```
➤
1260 RTS
1270 .execute
1280 EQUS "LOAD "
1290 ]:P%=P%+20:[OPT N%
1300 .transfer
1310 LDA #128:STA param
1320 LDA #&FF:STA param+3
1330 LDA #&FF:STA param+4
1340 LDA #&42
1350 LDX #param MOD 256
1360 LDY #param DIV 256
1370 JSR &FFF1
1380 RTS
1390 .param
1400 EQUD 0
1410 EQUD 0
1420 EQUW 0
1430 .blocklen
1440 SEC
1450 LDA &80:SBC &70:STA param+5
1460 LDA &81:SBC &71:STA param+6
1470 RTS
1480 .nextprog
1490 CLC
1500 LDA &70:ADC param+5:STA &70
1510 LDA &71:ADC param+6:STA &71
1520 CLC
1530 RTS
1540 .text
1550 .text1
1560 EQUS "Number of files to load "
1570 EQUB 0
1580 .text2 EQUS "File name ":EQUB 0
1590 .text3
1600 EQUS "Save swram image ? Y/N "
1610 EQUB 0
1620 .text4
1630 EQUS "CTRL/BREAK to initialise"
1640 EQUB 0
1650 .text4A EQUS "then *<star name>"
1660 EQUB 0
1670 .text5 EQUS "Not between 1 and 9"
1680 EQUB 0
1690 .text6 EQUS "NOT FOUND or SYNTAX E
RROR":EQUB 0
1700 .text7 EQUS "Bytes free ":EQUB 0
1710 .text8 EQUS "No room":EQUB 0
1720 .text9 EQUS "Source code too long"
1730 .text10 EQUS "Assembling code":EQU
B 0
1740 EQUB 0
1750 .prtext
1760 LDA text,X:BEQ rts:JSR &FFEE
1770 INX:BRA prtext
1780 .rts
1790 RTS
1800 .roms
1810 ]:P%=P%+36:[OPT N%
1820 .table
1830 ]:P%=P%+220:[OPT N%
1840 .osword
1850 EQUD 0:EQUB 0
1860 .buff
1870 ]:P%=P%+16:[OPT N%
1880 .osword0
1890 LDA #17:STA osword+2
1900 LDA #45:STA osword+3
1910 LDA #95:STA osword+4
1920 LDX #osword MOD 256
1930 LDY #osword DIV 256
1940 LDA #0
1950 JSR &FFF1
1960 RTS
1970 .tableaddress
1980 LDA #table MOD 256:CLC
1990 ADC &7D:STA osword
2000 LDA #table DIV 256
2010 ADC #0:STA osword+1
2020 RTS
2030 .insertfname
2040 LDX &7D:LDY #5
2050 .nextbyte
2060 LDA table,X:STA execute,Y
2070 CMP #13:BEQ rts3
2080 INX:INY:JMP nextbyte
2090 .rts3 RTS
2100 .movetable
2110 LDA #table MOD 256:STA param+1
2120 LDA #table DIV 256:STA param+2
2130 LDA #220:STA param+5:STZ param+6
2140 LDA #0:STA param+8
2150 LDA #&82:STA param+9
2160 JSR transfer
2170 RTS
2180 .bytesfree
2190 SEC
2200 LDA #&FF:SBC &80:STA &2A
2210 LDA #&BF:SBC &81:STA &2B
2220 LDA #134:JSR &FFEE
2230 LDX #(text7-text):JSR prtext
2240 JSR &A081
2250 JSR &FFE7:JSR &FFE7
2260 RTS
2270 .findtop
2280 LDY #0:STZ &8C:LDA #&E:STA &8D
2290 .ft
2300 LDA (&8C),Y:CMP #&D:BNE ft2
2310 INY:LDA (&8C),Y:CMP #&FF:BEQ ft3
2320 DEY
2330 .ft2
2340 JSR incft:JMP ft
2350 .ft3
2360 JSR incft:JSR incft
2370 RTS
2380 .incft
2390 CLC:LDA &8C:ADC #1:STA &8C
2400 LDA &8D:ADC #0:STA &8D
2410 RTS
2420 NOP
2430 ]NEXT
2440 ENDPROC
```

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```
  10 =    0 0   290 = 3208 7   570 = C95B 5   850 = 75E2 B  1130 = 2B19 E  1410 = AED4 F  1690 = 5F30 4
  20 =    0 0   300 = 9166 C   580 = AA46 A   860 = 4832 9  1140 = 7FBE 3  1420 = B4E7 E  1700 = 9CF6 F
  30 =    0 0   310 = 52A7 0   590 = 96CD 9   870 = E9DC 1  1150 = 84BC 5  1430 = 8A81 5  1710 = 6F50 D
  40 = 126A A   320 = CE48 3   600 = C1C7 9   880 =  7F6 A  1160 = 68E0 9  1440 = 8D00 4  1720 = 19E4 1
  50 = B9F7 9   330 = 9B98 1   610 = F4D0 B   890 = 9843 4  1170 = C0E8 1  1450 = F65C 0  1730 = DDAA B  1970 =  515 3  2210 = 9E8A C
  60 = 98A5 0   340 = 309D 8   620 = 27D2 6   900 = 9F64 F  1180 =  6CA 6  1460 = 56AA 0  1740 = 1C74 C  1980 = 2253 C  2220 = 1868 E
  70 = 1623 5   350 = A200 4   630 = 4B0D 6   910 = 6CD5 2  1190 = 73CA 8  1470 = 9843 6  1750 =  71B 2  1990 = 14EB F  2230 = 5243 7
  80 = EF70 5   360 = 8442 9   640 = 9B98 B   920 = 92BC 3  1200 = FBAD B  1480 = 2289 8  1760 = 9B5D F  2000 = 91CD B  2240 = BEDE 3
  90 = 7891 A   370 =  800 E   650 = 9166 D   930 = DD3F 5  1210 = 8212 1  1490 = 74FB 6  1770 = 8BD6 7  2010 = 7C16 D  2250 = EC57 0
 100 = 6272 E   380 = 970C D   660 = A2E4 A   940 = EF2B 6  1220 = 8EEE A  1500 = 307D 2  1780 = A915 4  2020 = 9843 C  2260 = 9843 B
 110 = 8BAE E   390 = 9570 8   670 = E1FF 0   950 = 815A 9  1230 = A7AC 5  1510 = D8EE 9  1790 = 9843 B  2030 = BE64 9  2270 = C4A0 B
 120 = 50EE 0   400 = E9C8 3   680 = 24CE 9   960 = 3E70 E  1240 = 4B0B B  1520 = 74FB E  1800 = ECD9 1  2040 = A9FF A  2280 = F0FE E
 130 = 8421 B   410 = D394 8   690 = D68B 6   970 = 9FFA 0  1250 = CECB 5  1530 = 9843 4  1810 =  C25 C  2050 = DB7C 4  2290 =  258 B
 140 = 62C2 4   420 = 309D 2   700 = 9B3E E   980 = 31D5 8  1260 = 9843 B  1540 = 80E0 5  1820 = 8902 4  2060 = F489 7  2300 = 176C 5
 150 = 2BB4 4   430 = A272 E   710 = F1DE A   990 = BE96 1  1270 = 54F9 B  1550 = 57FA F  1830 = BFC6 3  2070 = C7EA 8  2310 = CAE5 B
 160 = 4EB4 A   440 = EC57 6   720 = 74DE D  1000 = 9B98 6  1280 = A443 A  1560 = 60B4 4  1840 = D32A A  2080 = 3489 2  2320 = F888 2
 170 = 756C 1   450 = 6AE8 9   730 = 492F D  1010 = 9B4A D  1290 = 39E8 7  1570 = 1C74 B  1850 = E325 6  2090 = 68CB B  2330 = 6E53 8
 180 = B59F 3   460 = 9166 E   740 = 5231 A  1020 = 4EC5 B  1300 = 19CC 3  1580 = F1E6 9  1860 = EDB2 1  2100 = F761 B  2340 = 87DD 2
 190 = 69F4 B   470 = 52D5 5   750 = 81CC D  1030 = 9A41 F  1310 = 99EE 6  1590 = 77B8 6  1870 = D2AF C  2110 = 3DDA E  2350 = 7E72 3
 200 = 10DF 1   480 = C0CC 8   760 = 2418 8  1040 =  924 1  1320 = 3CBD C  1600 = 5A31 A  1880 = E74D 2  2120 = 2C7D 5  2360 = 55A6 A
 210 = B2F7 C   490 = A2B7 8   770 = 9B98 A  1050 = AEA3 F  1330 = 4C5A F  1610 = 1C74 3  1890 = E2C3 7  2130 = B630 1  2370 = 9843 A
 220 = 8A38 D   500 = 482E 0   780 = 9843 3  1060 = 69C2 8  1340 = 9BFD C  1620 =  75F 5  1900 = 316E 8  2140 = A63F 8  2380 = A227 3
 230 = 5DB6 3   510 = 924E F   790 = 2C12 6  1070 = 309D D  1350 = 44C3 F  1630 = 8219 D  1910 = 5382 C  2150 = 69DD 8  2390 = C7A6 D
 240 = F25F 9   520 = C70C B   800 = C54D C  1080 = 53F9 E  1360 = 7B21 6  1640 = 1C74 D  1920 = C8C1 1  2160 = FBAD C  2400 = F3EA 7
 250 = 171E 9   530 = 8748 2   810 = 77F2 B  1090 = 3C39 8  1370 = AE0D C  1650 = 47BB 6  1930 = 22BE 9  2170 = 9843 7  2410 = 9843 3
 260 = E067 8   540 = 9CCF 2   820 = 9D8D D  1100 = 69DC 9  1380 = 9843 8  1660 = 1C74 B  1940 =  295 B  2180 = 7DAB A  2420 = 41AB A
 270 = 7A80 7   550 = 6462 2   830 = CECB 6  1110 = 1174 A  1390 = B433 9  1670 = 7DA0 8  1950 = AE0D 8  2190 = 8D00 F  2430 = 5460 9
 280 = BDC2 3   560 = 1C81 F   840 = 4EC5 0  1120 = C8A4 1  1400 = AED4 6  1680 = 1C74 0  1960 = 9843 B  2200 = B56D A  2440 = ED0F B
```

Listing III

```
 10 REM SRB3 - Listing III
 20 REM by H.R.Wall
 30 REM (c) The Micro User
 40 FORN%=0 TO 2 STEP 2
 50 P%=&6E00
 60 [OPT N%
 70 LDA #?&81 DIV 16:JSR ascii
 80 STA savend
 90 LDA #?&81 MOD 16:JSR ascii
100 STA savend+1
110 LDA #?&80 DIV 16:JSR ascii:
120 STA savend+2
130 LDA #?&80 MOD 16:JSR ascii
140 STA savend+3
150 LDX #savestr MOD 256
160 LDY #savestr DIV 256
170 JSR &FFF7
180 RTS
190 .ascii
200 CMP #10:BCC ascz
210 ADC #6
220 .ascz
230 ADC #&30
240 RTS
250 .savestr
260 EQUS "*SRSAVE "
270 EQUS $&900
280 EQUS " 8000 "
290 .savend
300 EQUD 0
310 EQUS " 5"
320 EQUB 13
330 ]
340 NEXT
350 CALL !&86
360 END
```

```
 10 =    0 0   110 = C93E 4   210 = C178 0   310 = 23F2 C
 20 =    0 0   120 = E459 3   220 = E886 A   320 = 92BC F
 30 =    0 0   130 = 3DF4 E   230 = FF0C 2   330 = 8B58 4
 40 = E02B B   140 = F478 A   240 = 9843 5   340 = 2C83 B
 50 = B620 0   150 = 3B31 C   250 = 8DA6 B   350 = 8ED4 7
 60 = 7891 0   160 = D796 0   260 = 45C3 0   360 = FD2E 3
 70 = 6312 1   170 = CECB 2   270 = 2A3E E
 80 = 31FF 0   180 = 9843 B   280 = C4B0 F
 90 = 95D0 F   190 = 5189 6   290 = 75FF 1
100 = D43A E   200 = 99B1 2   300 = AED4 8
```

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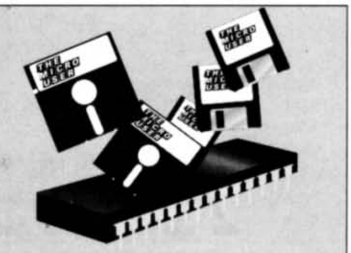

Listing IV

```
10000 REM SRB4 - Listing IV
10010 REM by H.R.Wall
10020 REM (c) The Micro User
10030 DEF FNxxx(Z%)
10040 [OPT pass%
10050 PHX:PHY
10060 LDX #12:STX &DA1
10070 LDX #Z% MOD 256:STX &D9F
10080 LDY #Z% DIV 256:STY &DA0
10090 JSR &FF00
10100 PLY:PLX
10110 ]:=pass%
```

```
  0 =    0 0    60 = 3722 6
 10 =    0 0    70 = 9D0D A
 20 =    0 0    80 = 847D 3
 30 = 8398 8    90 = 1CD3 7
 40 = 95CD 5   100 = BFFA 9
 50 = CFEF 9   110 = CC79 2
```

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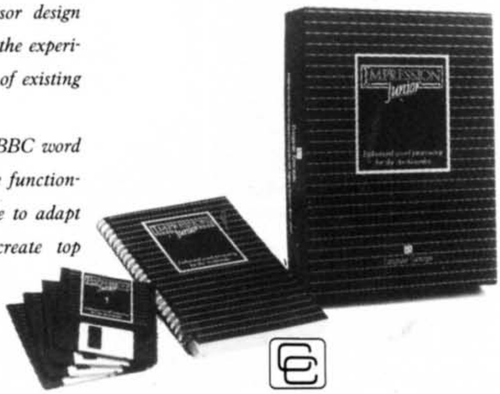

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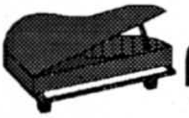

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Explore some techniques of data handling with Geoff Hawkins

Filing with random precision

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WRITING a database program can be fraught with problems even for an expert. But to a comparative newcomer to programming with no formal tuition, it can be nightmare.

So here's an opportunity to discover painlessly what many have gone through fire to learn.

The storage and retrieval of information on disc means using random access files. Unfortunately that name is a bit of a misnomer – if you really want to retrieve your data, random is the very last condition you want it in.

In fact a fair amount of precision is called for, and a little planning will make life a lot easier. The word random is used to indicate that when the database is in use you might be reading and writing anywhere within the file.

Like its paper counterpart, you must open a file on disc before reading or writing to it. There are either two or three commands for opening files in BBC Basic depending on whether you have version I or II.

These are:

- OPENIN only allows you to read from an existing file.
- OPENOUT allows data to be written to a file and should only be used when creating a file for the first time, as it will delete and overwrite any another file of the same name.
- OPENUP allows you to read from and write to an existing file.

In Basic I, OPENUP doesn't exist as a command but OPENIN allows read and write instead of just read. In fact, if OPENIN is entered on a Basic I machine it will list as OPENUP on a Basic II one. For compatability between the two it's best to avoid OPENIN on Basic II.

Each file on a disc filing system – DFS – has its own unique name and up to five can be kept open at a time. When you use one of the OPEN commands you need to specify which file you are referring to: You can use variables such as *info$* or *filename$*, or fixed strings like "phone" as shown in Listing II.

The DFS looks up the file name on its current disc and, if it finds it, opens it in the way specified and returns a unique number called the file handle which you should put into a variable:

```
fileHandle%=OPENUP(myFile$)
```

From this point on you must always tell the DFS which file you are referring to by using the file handle and you must explicitly close it when you've finished using:

```
CLOSE#fileHandle
```

Let's take as an example the address book. In a database all related information – a person's name, address, telephone number – is held in one block all together called a record. Each individual piece of data – first name, surname and so on – is held in its own separate field.

If you know a person's name and you're trying to find out their address the micro looks at the first name in the list, checks to see if it is the one you asked for, and if not moves on to the next – it does not read the whole address before rejecting it. It merely steps forward to the next name.

But that step is the thing – the program needs to know how big a step to take or it ends up down the wrong street. So it is up to you to make life easy by saving only names and addresses that are the same length. In that way the step size will always be the same – this is known as using fixed length records.

If you're writing your own database you need to decide in advance the maximum length of each field, hence the maximum record size which is your step size.

When moving through the file the DFS keeps track of its position using a pointer

➤

What the procedures do

WHEN you add a record to the file the first thing you need to do is look for an empty space – of course all the entries are empty at first.

PROCempty steps through the file looking for the first empty record. As it reads each record PTR# is automatically stepped forward by the DFS.

Data entry is handled by the procedures *screen*, *enter* and *details*. If any line exceeds its designated field length *PROCtoolong* asks you to retype it. This data entry routine is not the most refined possible. Any mistakes mean either not adding the entry to the file or saving it as it is, mistakes and all, then using the alter option to type over the offending line.

Before being added to the file each line is padded out with spaces to its maximum length. Between them procedures *look*, *search* and *display* find entries. The pointer – *start* – is incremented by the length of one record, so that if an incorrect entry is found the search does not go back to the beginning of the file.

The delete procedure does not delete, but fills up the first field with question marks. Otherwise the search and empty routines would not get beyond a deleted entry part way through the file.

The *FNupper* routine converts the case of the text on each search. This is not as fast as changing everything to upper case before saving, but it's best to have lower case for neater presentation.

The search also uses INSTR to find entries so that only part of a name need be specified.

➤

you access from Basic using the PTR# command. You can find out what the current value is with:

```
x=PTR#fileHandle%
```

or set it using:

```
PTR#fileHandle%=x
```

Let's say that the record size is held in a variable called *recordSize%*. You can set the pointer to the position of the 33rd record with:

```
PTR#fileHandle%=recordSize%*33
```

So how do you work out the value of this magic number called *recordSize%*? It depends on the amount and type of data you're going to be storing. Names and addresses have to be held in string variables while age could be stored as a whole number – an integer.

The space required by each string you use is determined by its maximum allowed length in characters – say 25 for the surname – plus two bytes. Numbers can be stored in rather less space: Five bytes for an integer or six for a decimal – floating point – number.

In the address book program I have stored the phone number as a string as it may contain a space between the code and the actual number, or even start with zero which you do not want to lose.

However in another database the cost of an item would be stored either as a floating point number – pounds and pence – or better as an integer (pence only) as floating point numbers are notorious for being slightly inaccurate.

Listing I will prepare an empty file of just 10 records for the Address Book program.

The procedures in Listing II are easily adapted to your own programs and their use is explained in the panel. It's best that you understand how they work, so read them through rather than just typing them in.

This is a simple introduction to a fairly complex subject. There are many other aspects which affect the way you write database programs, but with these basics you'll get a head start.

Listing I

```
 10 REM Random Access Filing - List I
 20 REM by Geoff Hawkins
 30 REM (c) The Micro User
 40 CLOSE#0
 50 CH=OPENOUT"phone"
 60 FOR X=1 TO 10
 70 RESTORE
 80 FOR Y=1 TO 8
 90 READ len%
100 PRINT#CH,STRING$(len%," ")
110 NEXT
120 NEXT
130 CLOSE#CH
140 PRINT"DONE"
150 DATA 25,20,20,20,20,20,10,15
```

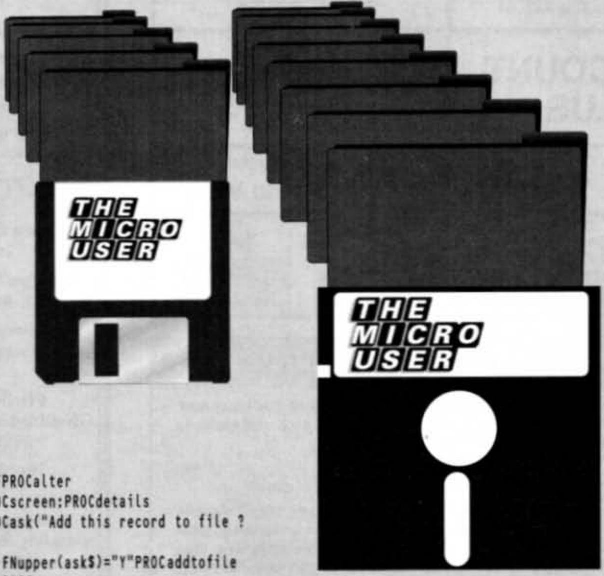
```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 9EE3 3
 50 = 1B66 7
 60 = 4F92 9
 70 = 9FF8 9
 80 = C63D 7
 90 = 6D71 7
100 = 5738 D
110 = 2C83 9
120 = 2C83 B
130 = 15B1 C
140 = FB18 4
150 = BF56 4
```

Get it right ✓

Listing II

```
  10 REM ADDRESS BOOK
  20 REM by Geoff Hawkins
  30 REM (c) The Micro User
  40 MODE7
  50 CLOSE#0
  60 DIMtext$(8),len%(8)
  70 start=0:PROCmenu
  80 END
  90 DEFPROCmenu
 100 REPEAT:alter=FALSE:delete=FALSE:no
room=FALSE
 110 *FX15,0
 120 CLS:RESTORE230:FOR loop=1TO5
 130 READ option$
 140 PRINTTAB(5,6+loop)option$:NEXT
 150 PRINTTAB(5,13)"Your choice ..";
 160 REPEAT:key=GET:UNTIL key>48 AND ke
y<54
 170 IF key=49 PROClook
 180 IF key=50 PROCclean:PROCenter
 190 IF key=51 alter=TRUE:PROClook
 200 IF key=52 delete=TRUE:PROClook
 210 UNTIL key=53
 220 ENDPROC
 230 DATA 1.....Consult Address Book.,2
.....Add Details.,3.....Alter Details.,4
.....Delete Record.,5.....Quit.
 240 DEFPROCenter
 250 REPEAT:PROCempty
 260 IF noroom=TRUE VDU7:PRINTTAB(5,15)
CHR$136;CHR$131;"NO MORE ROOM IN FILE":F
OR wait=1 TO 8000:NEXT:ask$="N":GOTO310
 270 PROCclean:PROCscreen:PROCdetails
 280 PROCask("Add this record to file ?
 (Y/N)")
 290 IF FNupper(ask$)="Y"PROCaddtofile
 300 PROCask("Any more ? (Y/N)")
 310 UNTIL FNupper(ask$)="N"
 320 ENDPROC
 330 DEFPROCscreen
 340 CLS:RESTORE380:FOR loop=1 TO 8
 350 READ line$,len%(loop)
 360 PRINTTAB(1,3+loop)line$;TAB(10)tex
t$(loop):NEXT
 370 ENDPROC
 380 DATA Name.,25,Address 1.,20,Addres
s 2.,20,Address 3.,20,Town.,20,County.,2
0,Post Code.,10,Phone No.,15
 390 DEFPROCclean
 400 FOR loop=1TO8:text$(loop)="":NEXT
 410 ENDPROC
 420 DEFPROCdetails
 430 FOR loop=1TO8:REPEAT
 440 INPUTTAB(10,loop+3)" "line$
 450 IF LEN(line$)>len%(loop)PROCtoolon
g
 460 UNTIL LEN(line$)<=len%(loop)
 470 IF alter=TRUE AND line$="" text$(l
oop)=text$(loop)ELSE text$(loop)=line$
 480 line$="":NEXT
 490 ENDPROC
 500 DEFPROCtoolong
 510 PRINTTAB(11,loop+3)SPC(LEN(text$(l
oop)))
 520 VDU7:PRINTTAB(11,loop+3)"TOO LONG
- PLEASE RE-ENTER";
 530 FOR wait=1 TO 5000:NEXT
 540 PRINTTAB(11,loop+3)SPC(27)
 550 ENDPROC
 560 DEFPROCask(message$)
 570 PRINT:PRINT:PRINT;SPC2;message$;
 580 REPEAT:ask$=GET$:UNTIL INSTR("YyNn
",ask$)>0
 590 ENDPROC
 600 DEFFNupper(string$)
 610 LOCAL count,temp$
 620 upper$=""
 630 FOR count=1 TO LEN string$
 640 temp$=MID$(string$,count,1)
 650 IF ASC temp$>=97 AND ASC temp$<=12
2 THENtemp$=CHR$(ASCtemp$-32)
```

```
  660 upper$=upper$+temp$
  670 NEXT
  680 =upper$
  690 DEFPROCaddtofile
  700 CH=OPENUP"phone"
  710 PTR#CH=start
  720 FOR loop=1 TO 8
  730 PRINT#CH,FNpad(text$(loop),len%(lo
op))
  740 NEXT:CLOSE#CH
  750 ENDPROC
  760 DEFFNpad(word$,length%)
  770 REPEAT
  780 IF LEN(word$)<length% word$=word$+
" "
  790 UNTIL LEN(word$)=length%
  800 =word$
  810 DEFPROClook
  820 REPEAT:start=0:CLS
  830 PRINTTAB(3,5)"Enter Name :";
  840  INPUT""search$:REPEAT:PROCsearch
  850 IF name$<>STRING$(25,"?") AND name
$<>STRING$(25," ") PRINTTAB(3,7)name$:PR
OCask("Is this the required record ? (Y/
N)"):IF FNupper(ask$)="Y" PROCdisplay
  860 IF name$=STRING$(25,"?") OR name$=
STRING$(25," ") OR name$="" PRINTTAB(3,7
)SPC30:PRINTTAB(0,10)SPC2;"No record wit
h this spelling found.":ask$="Y"
  870 UNTIL FNupper(ask$)="Y"
  880 PROCask("Any more ? (Y/N)")
  890 UNTIL FNupper(ask$)="N"
  900 ENDPROC
  910 DEFPROCsearch
  920 CH=OPENIN"phone"
  930 PTR#CH=start
  940 REPEAT
  950 INPUT#CH,name$
  960 PTR#CH=PTR#CH+139
  970 UNTIL name$=STRING$(25," ") OR INS
TR(FNupper(name$),FNupper(search$))>0 OR
 PTR#CH+166>=EXT#CH
  980 start=PTR#CH:CLOSE#CH
  990 ENDPROC
 1000 DEFPROCempty
 1010 CH=OPENIN"phone":
 1020 PTR#CH=0:REPEAT:INPUT#CH,name$
 1030 PTR#CH=PTR#CH+139
 1040 UNTIL name$=STRING$(25," ") OR nam
e$=STRING$(25,"?") OR PTR#CH+139>=EXT#CH
 1050 IF PTR#CH+139>=EXT#CH noroom=TRUE
 1060 PTR#CH=PTR#CH-166:start=PTR#CH
 1070 CLOSE#CH
 1080 ENDPROC
 1090 DEFPROCdisplay
 1100 PROCclean:CLS
 1110 PRINTTAB(3,5)""
 1120 CH=OPENIN"phone"
 1130 PTR#CH=start-166
 1140 FOR loop=1 TO 7
 1150 INPUT#CH,line$
 1160 IF line$<>STRING$(LEN(line$)," ")A
ND alter=FALSE PRINTTAB(4);line$
 1170 IF line$<>STRING$(LEN(line$)," ")t
ext$(loop)=line$
 1180 NEXT:PRINT:INPUT#CH,line$
 1190 IF line$<>STRING$(LEN(line$)," ")A
ND alter=FALSE PRINTTAB(4);line$
 1200 IF line$<>STRING$(LEN(line$)," ")t
ext$(8)=line$
 1210 CLOSE#CH
 1220 IF alter=TRUE start=start-166:PROC
alter
 1230 IF delete=TRUE start=start-166:PRO
Cdeleterecord
 1240 ENDPROC
```



```
 1250 DEFPROCalter
 1260 PROCscreen:PROCdetails
 1270 PROCask("Add this record to file ?
 (Y/N)")
 1280 IF FNupper(ask$)="Y"PROCaddtofile
 1290 ENDPROC
 1300 DEFPROCdeleterecord
 1310 PROCask("Delete this record ? (Y/N
)")
 1320 IF FNupper(ask$)="N" ENDPROC
 1330 CH=OPENUP"phone":PTR#CH=start
 1340 PRINT#CH,STRING$(25,"?"):CLOSE#CH
 1350 ENDPROC
```

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Get it right ✓

```
  10 =    0 0     350 = 1363 C     690 = 831F 1    1030 = E2A8 7
  20 =    0 0     360 = 2BD9 0     700 = D313 E    1040 = F1DA 4
  30 =    0 0     370 = ED0F 8     710 = DCAF 8    1050 = 3AD0 6
  40 = 8AFC C     380 = 32B2 8     720 = BC7A 6    1060 = 76D1 8
  50 = 9EE3 4     390 = 959E 6     730 = DD55 F    1070 = 15B1 7
  60 = 5203 9     400 = 88F4 1     740 = 9A8A 5    1080 = ED0F 3
  70 = AAA2 6     410 = ED0F 0     750 = ED0F 7    1090 = C225 8
  80 = FD2E 5     420 = FFE7 1     760 =  C91 4    1100 = F887 6
  90 = 87FA E     430 = 2025 F     770 = BFBA 8    1110 = DC45 A
 100 =  334 C     440 =  196 7     780 = 6CA5 9    1120 = 600E 2
 110 = 6C86 F     450 = B0FC 3     790 = 20D8 C    1130 = 7367 F
 120 = 4A91 1     460 = 329A D     800 = 83C1 0    1140 = 4D95 0
 130 = FB96 6     470 = 1DFC A     810 = F641 9    1150 =  9DE A
 140 = 7A55 2     480 = A5E4 F     820 = AA37 F    1160 = DD63 8
 150 = 40E9 1     490 = ED0F 2     830 = C3E3 9    1170 = DE2C 3
 160 = F3A3 5     500 = 19CA B     840 = D19D C    1180 = EF21 3
 170 = 34E6 7     510 =  30C E     850 = 8484 7    1190 = DD63 9
 180 =  DFD F     520 = AA36 E     860 = F99E 5    1200 = 3A75 6
 190 = E535 2     530 =  AAE 7     870 = 5D7D F    1210 = 15B1 A
 200 = 93B6 1     540 =   26 1     880 = 952C A    1220 = 18AE 3
 210 = 1988 D     550 = ED0F 3     890 = C799 D    1230 = 23F7 C
 220 = ED0F F     560 =  7C7 A     900 = ED0F B    1240 = ED0F 4
 230 = 8497 0     570 = B577 3     910 = B4D4 6    1250 = BA37 7
 240 = DE59 8     580 = DD31 B     920 = 600E A    1260 = CA5D 0
 250 = 1CF8 E     590 = ED0F 3     930 = DCAF 5    1270 = 8205 B
 260 = F658 0     600 = EF7A C     940 = BFBA A    1280 = BF29 9
 270 = 397E 9     610 = D6B7 3     950 = 91CE D    1290 = ED0F 5
 280 = 8205 2     620 = B389 A     960 = E2A8 3    1300 = C520 2
 290 = BF29 B     630 = C491 3     970 = 42D1 D    1310 = 523E 0
 300 = 952C 9     640 = 27EC 8     980 = 4152 6    1320 = CB36 5
 310 = C799 F     650 = 3C7A 5     990 = ED0F 1    1330 = E434 6
 320 = ED0F 3     660 = 24C4 7    1000 = 186C 7    1340 = CBEB C
 330 = F5B9 D     670 = 2C83 9    1010 = F5BF 5    1350 = ED0F D
 340 = E316.E     680 = 90AF 3    1020 = B457 B
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Going faster still...

Gareth Long introduces SpeedROM to give your Arm even longer legs

WE all know the ARM chip set that powers the Archimedes and BBC A3000 is fast. Its amazing speed compared with other micros has allowed the development of highly sophisticated software.

However, running a large number of complex tasks from the DeskTop can result in a sluggish response, so any further speed increases would be useful.

The speed at which a memory chip is *clocked* controls how fast it can return the data contained within it – in fact one of the miracles of the 32 bit machines is that they run so fast using ordinary memory chips. Faster chips are, naturally, more expensive.

The operating system roms run at 4MHz, whereas the ram is clocked at twice that. This means that Basic and other programs within the operating system could be speeded up if they could be run from ram.

A command has already been provided to do this – *RMFaster – however this is not ideal because every module that you speed up occupies precious memory which could be better spent elsewhere. This is especially awkward on a 1Mb machine.

In addition, the modules which would have most effect if speeded up cannot be moved – for example, UtilityModule and Kernel. These are responsible for some of the things we most want increased speed out of, for example, VDU output and the like.

But all is not lost. The memory controller – MEMC – can be forced to access the operating system roms at ram speed. But this cannot be guaranteed to work with all systems, as different rom types may or may not run at this increased speed, and a failure would result in a horrible crash.

SpeedROM handles all this , and on suitable systems can provide up to a 25 per cent increase in program running speed.

Type in Listing I carefully, ensure you've made no typing errors using the checksums, save then run it. The Utility SpeedROM will be assembled and saved on to your disc. Typing *SpeedROM -P at the basic prompt will result in SpeedROM being loaded into the relocatable module area.

A check will be made to see if the system roms will run at the increased speed, and if they can the utility will ask you if you wish the Roms to run at the higher speed. It is at this point that you will notice the difference that extra 25 per cent makes.

DeskTop operation is far smoother than before, and there's a much more fluid feel to dragging windows if you have configured the machine to drag the whole window instead of just the outlines.

The PC and 6502 emulators run at a marginally faster speed and benchtests on Basic programs will show on average a speed increase of around 20 per cent, increasing to 25 per cent at times depending on the amount of rom accessing.

The utility follows all the guidelines set by Acorn for its operation. You may specify a number of parameters after the SpeedROM command and a combination may be used together to achieve multiple effects. The possible parameters are:

If your machine passes the speed test you can use Listing II to create a little module which keeps the roms in their speeded up state even after a soft break.

Using these utilities you have all you need to beef up the power of your BBC A3000 or Archimedes. The speed increase is larger than that provided by the MEMC1a upgrade, but normal operation cannot be guaranteed at all times. Some roms may work for a little while, then crash after the machine has been on for some time, so be sure to test the utility when the machine has warmed up a little. If you are working with very precious data you would be advised to run the machine with the roms at their normal speed.

➤

SpeedROM options

-P		Prompt for acknowledgement as to whether roms should be speeded up. This could be useful if the utility is distributed on discs, for example, with games on it which may be more difficult to play when speeded up.
-S	Status	Using this keyword will result in a status message giving you information on the current state of your operating system roms.
-V	Verbose	This lets you know what the utility is doing as it is happens.
-E	Error	Returns with an error if the roms are not capable of running at the faster speed. This is useful to enable an application to discover whether a machine is capable of running at high speed.
-T	Test	The utility will report back if the roms are capable of running at high speed, without actually speeding them up afterwards.
-H	help	Display a help list on available commands.
-R		Return rom speed to normal.

Listing I

```
   10 REM >SpdROMSRC
   20 REM By Gareth S. Long.
   30 REM (c) The Micro User
   40 length%=&A00
   50 DIM code% length%
   60 FORI%=0TOlength%STEP4:I%
!code%=0:NEXT
   70 help=0    :REM help mess
age activated
   80 verbose=4 :REM Gives inf
ormation while running
   90 testroms=8:REM Just chec
ks to see if ROMs will run at
8MHz
  100 reflect=12:REM Reflect t
he current MEMC state
  110 prompt=16 :REM If ROMs p
ass, ask user for permission t
o run ROMs at 8MHz
  120 error=20  :REM Quit with
 error if ROMs fail test
  130 return=24 :REM Return RO
M speed to 4MHz
  140 oldmemc=28:REM MEMC Stat
e on entry
  150 FORI%=0TO3 STEP 3
  160 P%=code%
  170 [OPT I%
  180  SUB   r13, r13,#&100
  ; Gets around known bug in A
rthur 1.20
  190  STMFD r13!,{r0-r12,r14}
  200  STMFD r13!,{r14}
  210  LDRB  r0,[r1]
  220  BL    noparams
  230  CMP   r0,#&20
  240  BLGE  decodeparams
  250  LDMFD r13!,{r14}
  260  LDR   r0,[r12,#help]
  270  CMP   r0,#&FF
  280  ADREQ r0,version
  290  SWIEQ "XOS_Write0"
  300  ADREQ r0,syntaxmessage
  310  SWIEQ "XOS_Write0"
  320  ADREQ r0,helptext
  330  SWIEQ "XOS_Write0"
  340  BEQ   exit
  350  LDR   r0,[r12,#verbose]
  ; Verbose - initialisation
  360  CMP   r0,#&FF
  370  ADREQ r0,version
  380  SWIEQ "XOS_Write0"
  390  LDR   r0,[r12,#return]
  400  CMP   r0,#&FF
  410  BNE   pretest
  420  MOV   r0,#&00
  430  MOV   r1,#&40
  440  SWI   "XOS_UpdateMEMC"
  450  LDR   r0,[r12,#verbose]
  460  CMP   r0,#&FF
  470  BNE   exit
  480  ADR   r0,returnmess
  490  SWI   "XOS_Write0"
  500  B     exit
  510 .returnmess
  520  EQUS  "System ROM Speed
 returned to 4MHz"+CHR$10+CHR$
13+CHR$0
  530  ALIGN
  540 .pretest
  550  MOV   r0,#&00
  560  MOV   r1,r0
  570  SWI   "XOS_UpdateMEMC"
  580  STR   r0,[r12,#oldmemc]
  590  MOV   r2,r0
  600  LDR   r1,[r12,#reflect]
  610  LDR   r0,[r12,#verbose]
  620  ORR   r1,r1,r0
  630  CMP   r1,#&FF
  640  BNE   test
  650  ADR   r0,speedmessagea
  ; user request for ROM statu
s or Verbose
  660  SWI   "XOS_Write0"
  670  AND   r2,r2,#&40
  680  CMP   r2,#&40
  690  ADREQ r0,speededup
  700  ADRNE r0,notspeededup
  710  SWI   "XOS_Write0"
  720  LDR   r0,[r12,#verbose]
  730  CMP   r0,#&FF
  740  BNE   exit
  750 .test
  760  MOV   r0,#&30
  770  MOV   r1,r0
  780  SWI   "XOS_UpdateMEMC"
  ; Speed up lower ROM bank
  790  MOV   r0,#&00
  800  MOV   r1,#&40
  810  SWI   "XOS_UpdateMEMC"
  ; Slow down higher ROM bank
  820  MOV   r0,#&3400000
; Lower bank (Unused)
  830  MOV   r1,#&3800000
; Higher bank (Used)
  840  MOV   r10, #&00
  850 .loop
  860  LDMIA r0!, {r2-5}     ;
Checksums speeded up bank with
  870  LDMIA r1!, {r6-9}     ;
Normal speed bank. The ROM tes
t
  880  EOR   r2,r2, r6       ;
will fail if a difference is
  890  EOR   r3,r3, r7       ;
detected between the two banks
.
  900  EOR   r4,r4, r8
  910  EOR   r5,r5, r9
  920  ORR   r10, r10,r2
  930  ORR   r10, r10,r3
  940  ORR   r10, r10,r4
  950  ORR   r10, r10,r5
  960  TST   r0,#&80000
  970  BEQ   loop
  980  MOV   r11, r10
  990  MOV   r0,#&00
 1000  MOV   r1,#&30
 1010  SWI   "XOS_UpdateMEMC"
  ; Slow down lower bank again
 1020  LDR   r0,[r12,#oldmemc]
 1030  MOV   r1,r0
 1040  SWI   "XOS_UpdateMEMC"
  ; add bits to initial value
 1050 .prepokerom
 1060  LDR   r0,[r12,#testroms
]
 1070  LDR   r1,[r12,#verbose]
 1080  ORR   r0,r0,r1
 1090  CMP   r0,#&FF
 1100  BNE   pokerom
 1110  ADR   r0,speedmessagea
  ; user request for speed che
ck or Verbose
 1120  SWI   "XOS_Write0"
 1130  CMP   r11, #&00
 1140  ADREQ r0,passedmess
 1150  ADRNE r0,failedmess
 1160  SWI   "XOS_Write0"
 1170  LDR   r0,[r12,#verbose]
 1180  CMP   r0,#&FF
 1190  BNE   exit
 1200  B     pokerom
 1210 .syntaxmessage
 1220  EQUS  "Syntax: SpeedROM
 [-h] [-v] [-t] [-s] [-p] [-e]
 [-r]"+CHR$10+CHR$10+CHR$13+CH
R$0
 1230  ALIGN
 1240 .version
 1250  EQUS  "SpeedROM 1.00 [2
9-May-89]"+CHR$10+CHR$13+CHR$0
 1260  ALIGN
 1270 .helptext
 1280  EQUS  "SpeedROM attempt
s to increase System ROM speed
"+CHR$10+CHR$13
 1290  EQUS  "by reprogramming
 MEMC. SpeedROM takes various"
+CHR$10+CHR$13
 1300  EQUS  "extra parameters
 as follows."+CHR$10+CHR$10+CH
R$13
 1310  EQUS  "  -H  Help  - ac
tivate extra help"+CHR$10+CHR$
13
 1320  EQUS  "  -V  Verbose -
activate SpeedROM messages"+CH
R$10+CHR$13
 1330  EQUS  "  -T  Test  - ju
st test system ROMs at 8MHz"+C
HR$10+CHR$13
 1340  EQUS  "  -S  Status  -
just reflect current ROM state
"+CHR$10+CHR$13
 1350  EQUS  "  -P  Prompt  -
Prompt user for permission to
run ROMs at 8MHz"+CHR$10+CHR$1
3
 1360  EQUS  "  -E  Error   -
return with error if ROMs fail
 speed test"+CHR$10+CHR$13
 1370  EQUS  "  -R  Return  -
Return ROM speed to 4MHz"+CHR$
10+CHR$10+CHR$13+CHR$0
 1380  ALIGN
 1390 .passedmess
 1400  EQUS  "are capable of r
unning at 8MHz"+CHR$10+CHR$13+
CHR$0
 1410  ALIGN
 1420 .failedmess
 1430  EQUS  "are incapable of
 running at 8MHz"+CHR$10+CHR$1
3+CHR$0
 1440  ALIGN
 1450 .pokerom
 1460  CMP   r11, #&00
 1470  BNE   failed
 1480  LDR   r0,[r12,#prompt]
 1490  CMP   r0,#&FF
 1500  BNE   updatememc
 1510  ADR   r0,promptmess
; user request to provide prom
pt
 1520  SWI   "XOS_Write0"
 1530 .input
 1540  SWI   "XOS_ReadC"
 1550  AND   r0,r0,#&DF
 1560  CMP   r0,#ASC"Y"
 1570  SWIEQ "XOS_WriteC"
 1580  MOVEQ r0,#&0A
 1590  SWIEQ "XOS_WriteC"
 1600  MOVEQ r0,#&0D
 1610  SWIEQ "XOS_WriteC"
 1620  BEQ   updatememc
 1630  CMP   r0,#ASC"N"
 1640  SWIEQ "XOS_WriteC"
 1650  MOVEQ r0,#&0A
 1660  SWIEQ "XOS_WriteC"
 1670  MOVEQ r0,#&0D
 1680  SWIEQ "XOS_WriteC"
 1690  BEQ   exit
 1700  B     input
 1710 .updatememc
 1720  MOV   r0,#&40
 1730  MOV   r1,r0
 1740  SWI   "XOS_UpdateMEMC"
  ; Actually speed up the ROMs
!
 1750  LDR   r0,[r12,#verbose]
 1760  CMP   r0,#&FF
 1770  BNE   exit
 1780  ADR   r0,done
 1790  SWI   "XOS_Write0"
; Verbose - inform task comple
te
 1800  B     exit
 1810 .speedmessagea
 1820  EQUS  "The System ROMs
"+CHR$0
 1830  ALIGN
 1840  .speededup
 1850  EQUS  "are currently op
erating at RAM speed - 8MHz"+C
HR$10+CHR$13+CHR$0
 1860  ALIGN
 1870 .notspeededup
 1880  EQUS  "are currently op
erating at ROM speed - 4MHz"+C
HR$10+CHR$13+CHR$0
 1890  ALIGN
 1900 .failed
 1910  LDR   r0,[r12,#error]
; FAILED. error out if specifi
ed
 1920  CMP   r0,#&FF
 1930  LDMEQFD r13!,{r0-r12,r1
4}
 1940  ADREQ   r0,failederror
 1950  ORREQS  pc,r14,#&100000
00
 1960 .exit
 1970  LDMFD r13!,{r0-r12,pc}
 1980 .noparams
 1990  MOV   r2,#&00
 2000  STR   r2,[r12,#help]
;
 2010  STR   r2,[r12,#verbose]
  ;
 2020  STR   r2,[r12,#testroms
] ; Defaults
 2030  STR   r2,[r12,#reflect]
  ;
 2040  STR   r2,[r12,#prompt]
  ;
 2050  STR   r2,[r12,#error]
;
 2060  STR   r2,[r12,#return]
```

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```
 ;
 2070  MOV   pc,r14
 2080 .decodeparams
 2090  LDRB  r0,[r1,#&00]
 2100  CMP   r0,#&20
 2110  ADDEQ r1,r1, #&01     ;
if space, recurse
 2120  BEQ   decodeparams
 2130  CMP   r0,#&00
 2140  MOVEQ pc,r14          ; if
zero, end decode loop
 2150  CMP   r0,#ASC"-"
 2160 .badsyntax
 2170  ADRNE r0,version
 2180  SWINE "XOS_Write0"
 2190  ADRNE r0,syntaxmessage
 2200  SWINE "XOS_Write0"
; bad syntax
 2210  LDMNEFD r13!,{r14}
 2220  BNE   exit
 2230  MOV   r2,#&FF         ; fo
und a command
 2240  ADD   r1,r1, #&01
 2250  LDRB  r0,[r1,#&00]
 2260  ADD   r1,r1, #&01
 2270  AND   r0,r0, #&DF
 2280  CMP   r0,#ASC"H"
 2290  STREQ r2,[r12,#help]
 2300  BEQ   decodeparams
 2310  CMP   r0,#ASC"V"
 2320  STREQ r2,[r12,#verbose]
 2330  BEQ   decodeparams
 2340  CMP   r0,#ASC"T"
 2350  STREQ r2,[r12,#testroms
]
 2360  BEQ   decodeparams
 2370  CMP   r0,#ASC"S"
 2380  STREQ r2,[r12,#reflect]
 2390  BEQ   decodeparams
 2400  CMP   r0,#ASC"P"
 2410  STREQ r2,[r12,#prompt]
 2420  BEQ   decodeparams
 2430  CMP   r0,#ASC"E"
 2440  STREQ r2,[r12,#error]
 2450  BEQ   decodeparams
 2460  CMP   r0,#ASC"R"
 2470  STREQ r2,[r12,#return]
 2480  BEQ   decodeparams
; recurse to look for more
 2490  BNE   badsyntax       ;
unrecognised request
 2500 .promptmess
 2510  EQUS  "Your system ROMs
 are able to run at twice the
current"+CHR$10+CHR$13
 2520  EQUS  "Speed. This can
result in a 20% increase in ov
erall speed."+CHR$10+CHR$13
 2530  EQUS  "Do you wish to t
ake advantage of this speed in
crease (Y/N)?"+CHR$0
 2540  ALIGN
 2550 .failederror
 2560  EQUD  &28900
 2570  EQUS  "System ROMs inca
pable of running at 8MHz"+CHR$
0
 2580  ALIGN
 2590 .done
 2600  EQUS  "The System ROMs
are now running at 8MHz"+CHR$1
0+CHR$13+CHR$0
 2610  ALIGN
 2620 .Version
 2630  EQUS  "MEMC ROM Acceler
ator Version 1.00 (29 May 1989
)"+CHR$13
 2640  ALIGN
 2650 ]
 2660 NEXT
 2670 OSCLI  "Save SpeedROM "+
STR$~code%+" "+STR$~P%
 2680 *SetType SpeedROM FFC
 2690 END
```

Get it right ✓

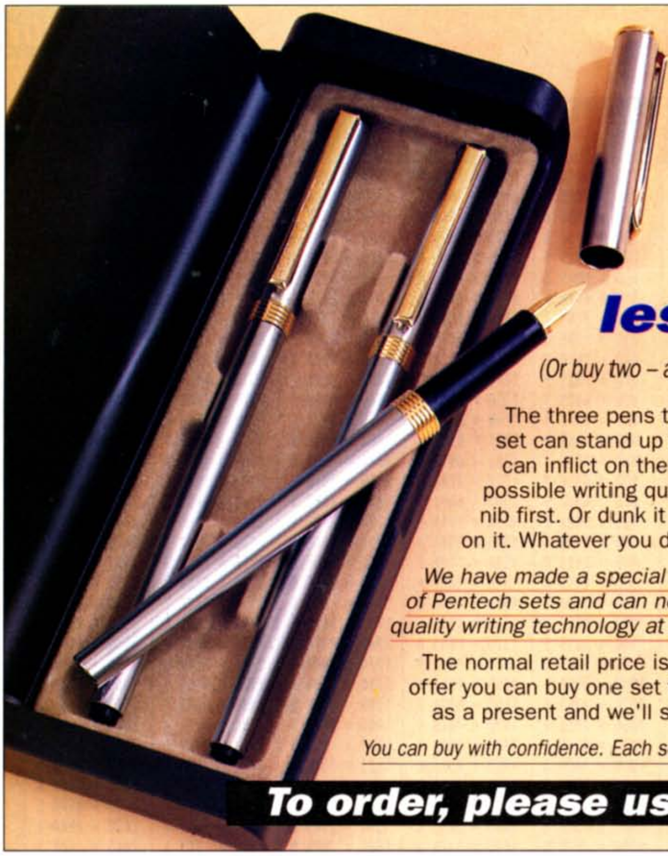
```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 3497 7
  50 =  8D6 5
  60 = F0DD 6
  70 = 8CB7 D
  80 = B952 7
  90 = 590B 5
 100 = 7035 8
 110 = 575B B
 120 = A99C 6
 130 =  276 D
 140 = FF84 A
 150 = 605F 3
 160 =   7B A
 170 = E106 3
 180 = A27C 5
 190 = DFA7 D
 200 = E37E 9
 210 = 6DCD 9
 220 = 3FFE 5
 230 = 2C8C 4
 240 = 3196 7
 250 = F7E4 6
 260 = CCC3 1
 270 = F640 3
 280 = 629D 0
 290 = 3571 4
 300 = 3794 1
 310 = 3571 5
 320 = 7492 9
 330 = 3571 6
 340 = 40E7 C
 350 = 6479 3
 360 = F640 0
 370 = 629D F
 380 = 3571 D
 390 = CD9B C
 400 = F640 C
 410 = DEB2 F
 420 = 39C1 6
 430 = B0A5 E
 440 =   E4 5
 450 = 5694 6
 460 = F640 3
 470 = 7685 D
 480 = 2908 3
 490 = BCC4 C
 500 = 38D1 7
 510 = 2EDC 9
 520 = 66DC 5
 530 = 24FA 6
 540 =  E49 6
 550 = 39C1 7
 560 = 9550 F
 570 =   E4 7
 580 = CF0D C
 590 =  E8C A
 600 = 39DA B
 610 = 5694 B
 620 = 2046 2
 630 = B3E0 F
 640 = F61C 4
 650 = 141C 3
 660 = BCC4 F
 670 = 435A 8
 680 =  D6A 6
 690 = 83EB 0
 700 = BC24 B
 710 = BCC4 2
 720 = 5694 2
 730 = F640 2
 740 = 7685 1
 750 = 5C1A B
 760 = 6C92 E
 770 = 9550 A
 780 = A534 B
 790 = 39C1 B
 800 = B0A5 3
 810 = FEB0 0
 820 = 7761 2
 830 = 198E 0
 840 = 1E5B E
 850 =  325 9
 860 = 4805 5
 870 = 2AFF 1
 880 = AD6E B
 890 = 8BD5 1
 900 = B6CF 9
 910 = 4B6C 4
 920 = 992D 2
 930 = 890C F
 940 = F9EB 0
 950 = E9CA A
 960 = 140B 7
 970 = 9F41 D
 980 = BE13 5
 990 = 39C1 C
1000 = 2932 D
1010 = 6385 C
1020 = 7116 1
1030 = 9550 6
1040 = 160A 2
1050 = 9082 1
1060 = 31F5 C
1070 = FEB0 8
1080 = FEB2 6
1090 = F640 D
1100 = 2B3B 9
1110 = 52A2 0
1120 = BCC4 3
1130 = 2EBD 2
1140 = 2C9A D
1150 = F619 5
1160 = BCC4 0
1170 = 5694 9
1180 = F640 C
1190 = 7685 2
1200 = EFEC 3
1210 = 50A7 D
1220 = 5624 2
1230 = 24FA F
1240 = CF0E E
1250 = 56C7 5
1260 = 24FA 8
1270 = 83D5 3
1280 = 6976 5
1290 = 2252 A
1300 = 6D9C E
1310 = B711 D
1320 = 2BF1 6
1330 = 1C5E F
1340 = 120F A
1350 =  AD4 4
1360 = EC51 5
1370 = 4863 B
1380 = 24FA 9
1390 = 9EEF A
1400 = 890D 7
1410 = 24FA 4
1420 = 689C 6
1430 = 2CC6 C
1440 = 24FA D
1450 = FBC0 4
1460 = 2EBD C
1470 = 332B A
1480 = 8BA4 B
1490 = F640 7
1500 = 24E1 7
1510 = 176E 2
1520 = BCC4 F
1530 = EE34 B
1540 = 1AE8 1
1550 = 1875 2
1560 = 187A B
1570 = 687B 5
1580 = 5924 0
1590 = 687B 6
1600 =  981 0
1610 = 687B 7
1620 = DBD3 5
1630 = 829E 1
1640 = 687B 3
1650 = 5924 C
1660 = 687B D
1670 =  981 6
1680 = 687B E
1690 = 40E7 9
1700 =  19E 9
1710 = 8E4E 6
1720 = F505 C
1730 = 9550 0
1740 =  AF7 D
1750 = 5694 E
1760 = F640 2
1770 = 7685 1
1780 = E32B C
1790 = 9DCB 2
1800 = 38D1 C
1810 =  D5A 4
1820 = C32A 8
1830 = 24FA 6
1840 = 5B13 F
1850 = C969 E
1860 = 24FA B
1870 = 46ED 4
1880 = 8C5A B
1890 = 24FA 5
1900 = A158 A
1910 = 21C5 5
1920 = F640 B
1930 = E60D A
1940 = 9DB1 3
1950 = FF4A B
1960 = DC83 B
1970 = 9DF6 2
1980 = 3804 A
1990 = B281 7
2000 = CFB6 E
2010 = A931 B
2020 = 68D3 7
2030 = EEB7 4
2040 =  445 E
2050 = A7E3 8
2060 = A4D4 8
2070 = 1C0B F
2080 = 64D8 9
2090 =  F61 C
2100 = 2C8C C
2110 = 7234 3
2120 = C786 7
2130 = 4AEE 7
2140 = A49A E
2150 = DCE7 4
2160 = 804E 8
2170 = 9CE6 1
2180 = CA43 9
2190 = D7F2 4
2200 = 9C5F F
2210 = 1FEC 6
2220 = 7685 5
2230 = C466 7
2240 = 93B9 6
2250 =  F61 D
2260 = 93B9 4
2270 =  FC5 5
2280 = 2838 D
2290 = 7ED5 9
2300 = C786 B
2310 =  844 3
2320 = 6FDE F
2330 = C786 5
2340 = 6E26 F
2350 = DC8F D
2360 = C786 F
2370 = F7B1 2
2380 = A8B4 A
2390 = C786 A
2400 = A2E2 F
2410 = 813C F
2420 = C786 8
2430 = 5E64 9
2440 = 2CBB 7
2450 = C786 D
2460 = C480 4
2470 = C703 3
2480 = 7B5B B
2490 = C32B 5
2500 = 947A D
2510 = AF37 A
2520 = 64A4 B
2530 = CDD7 C
2540 = 24FA C
2550 = 16F2 B
2560 = D948 A
2570 = 3F45 2
2580 = 24FA 2
2590 = F743 7
2600 = 1EFB E
2610 = 24FA B
2620 = A1F8 C
2630 = 69A0 F
2640 = 24FA 3
2650 = 8B58 F
2660 = 2C83 8
2670 = EBAC 7
2680 = D9D1 0
2690 = FD2E 5
```

Listing II

```
   10 REM>FastROMSRC
   20 REM by Gareth S. Long
   30 REM (c) The Micro User
   40 CLS:PROCinit:PROCassm:PR
OCsave:END
   50 DEFPROCinit
   60 Version$="1.00"
   70 Date$="(29 May 1989)"
   80 buff%=&400
   90 DIM code% buff%
  100 FORI%=code% TO (code%+bu
ff%) STEP 4:!I%=0:NEXT
  110 ENDPROC
  120 DEFPROCassm
  130 FORI%=4TO6STEP2
  140 P%=0:O%=code%
  150 [OPT I%
  160  EQUD 0
  170  EQUD code
  180  EQUD code
  190  EQUD code2
  200  EQUD titlemess
  210  EQUD helpmess
  220  EQUD 0
  230 .titlemess
  240  EQUS "FastROM"+CHR$0
  250  ALIGN
  260 .helpmess
  270  EQUS "Fast ROMs"+CHR$9+
Version$+" "+Date$+CHR$0
  280  ALIGN
  290 .code2
  300  CMP   r1,#&46
  310  BEQ   code
  320  MOV   pc,r14
  330 .code
  340  STMFD r13!,{r0-r6,r14}
  350  MOV   r0,#&40
  360  MOV   r1,#&40
  370  SWI   "XOS_UpdateMEMC"
  380  LDMFD r13!,{r0-r6,pc}
  390 ]:NEXT
  400 ENDPROC
  410 DEFPROCsave
  420 OSCLI"Save $.Modules.Fas
tROM "+STR$~code%+" "+STR$~(co
de%+P%)
  430 *SetType $.Modules.FastR
OM &FFA
  440 *Key 1 *RMLoad $.Modules
.FastROM|M
  450 ENDPROC
```

Get it right ✓

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 78FA A
 50 = 344C A
 60 = 6454 3
 70 = C006 2
 80 = 372F B
 90 = 44DC 7
100 =  30F 7
110 = ED0F E
120 = DF1D 3
130 = B14B 8
140 = AAAE 8
150 = E106 3
160 = AED4 A
170 = DD2E 1
180 = DD2E B
190 = 22C1 D
200 = A731 2
210 =   DD 8
220 = AED4 5
230 = CB9A B
240 = 1787 5
250 = 24FA 4
260 = C718 9
270 = 8DD2 2
280 = 24FA C
290 = 6AFC C
300 = A34C 1
310 = D5C1 D
320 = 1C0B 2
330 = 49A5 C
340 = 8890 C
350 = F505 F
360 = B0A5 5
370 =   E4 A
380 = 18A2 2
390 = DA42 6
400 = ED0F 7
410 = 7A2C A
420 = FE4E C
430 = D776 5
440 = A4F4 2
450 = ED0F 6
```



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King Albert solution

£10 Prize letter

I HAVE taken up the challenge to the King Albert Patience game from the May 1990 issue and here's a solution to game 2285 with no redeals, read from left to right:

```
2-P  8-3 R2-2  1-2  7-1 R4-4  7-4
9-7  1-9  1-8  9-8  6-9 R3-9  1-9
1-4  1-P  1-P  5-P  6-P  9-1  5-2
5-3  6-P R6-P R1-P  5-6  5-P  5-P
9-5
9-3  5-3  1-3  8-5  1-P  8-9  8-1
9-1  5-1  2-5  2-8  5-8
2-5  2-9  5-9  8-5  8-9  5-9  2-7
2-5  2-5  2-8  2-P  4-P  3-P  2-5
4-P  3-P  4-P  4-P  4-8  3-P  3-P
3-2  3-8  2-8  6-8  4-2 R7-2  3-2
3-P  6-P  3-5  3-5  3-P  3-P  4-P
8-P  1-P R5-P  8-P  1-P  1-3  1-6
```

– A. S. Cockeril, Middlesbrough, Cleveland.

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

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Twopenny coloured

ANYONE who uses PMS Publisher wih either Interword – which I use – Wordwise or View will be impressed by the quality of the layouts and printed word it produces.

But I wonder how many have considered using its facility to switch from graphics mode to normal printer output to produce letters with headings.

It's very simple. Just design your letter heading – and footer if you want one – with the necessary embedded commands and Publisher Macros saved to disc.

Make sure the cursor is on the top line under the heading to type in the date and start your letter.

Also ensure you have included the command to switch off the Publisher (255) under the heading, and to switch it on again (254) after the text of the letter if you have a footer, want to make multiple copies, or do a mail shot.

Another feature which will add distinction to your cheap headed notepaper is to treat yourself to a coloured ribbon cassette from Watford Electronics. Then include a pause command to stop printing so that you can quickly change the printer ribbon cassette. – **G.P.W. Winterman, Prendergast Junior School, Haverfordwest, Pembrokeshire.**

Fred Drip back on line

RECENTLY my younger brother, James, entered the listing for Fred Drip *from the July 1989 issue of* The Micro User.

The program was checksummed and, after a few small errors had been corrected, all the numbers tallied.

But when the program was run Fred would walk through walls rather than climb up them, drips fell through the floor and ladders took Fred right to the top of the screen before corrupting the display and causing the game to crash.

The listing was then checked line by line and still no errors were found. I began to suspect that the problem was due to the fact that we own a Master 128.

Having experienced graphics problems when moving my own programs from one machine to the other, I recalled that the Model B's user-definable characters are default blank – and the 128's are preset to Greek and other characters.

So I typed in a short routine to define all the characters from 128 to 255 as empty spaces.

This rectified the fault and Fred Drip ran perfectly – it's a very enjoyable game.

I later discovered that only the 255 block required wiping for this game. This can be achieved by adding the following line to the listing shown:

```
95 VDU23,255,0;0;0;0;
```

– Andrew Steer, Stanmore, Middx.

Saving Quest screens

IN response to Mr A. L. Smith's letter in the May issue on the conversion of Quest Screens to normal format, why not save them as such in the first place?

Enter the I/O menu and click once on the Print option. This ensures that the artwork is on screen before the command is issued. Then type after the prompt:

```
SA.F 3000 8000
```

Where F *is a filename of one character length. It can be *RENAMEd with a longer name afterwards, but the limitation is due to the maximum length of a command issued in this way.*

Unfortunately this doesn't save the palette, which has to be defined. I am not sure how to save the palette, but if its memory locations could be saved too, it would make the excellent Quest Paint more flexible without any programming. – **Alexander Seeley (age 14), London.**

More games cheats

IN the May issue James Page presented some cheats for games that had been published in The Micro User.

The one for Dickie Brickie *wasn't as helpful as it might be because, although you can collect all the extra life symbols, the counter is set back to three when you lose a life. Just remove line 2260 and you don't lose lives at all.*

Add these lines to part two of the game:

```
1371 IFINKEY-97lv%=0
1372 IFINKEY-72IFSN%<=10
SN%=SN%+1:COLOUR3:COLOUR
128:PROCscreen:COLOUR3:C
OLOUR128:PROCstart
```

Line 1371 is a suicide button – press Tab if you're bored. Line 1372 is a level jump for levels one to ten – I leave the other six for you to discover for

Turn to Page 120

The Micro User gui

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From Page 117

yourself. Do not renumber the program, otherwise it will crash. – **Stephen Scott, Surrey.**

Now the plot thickens

ALTHOUGH many different drawing programs have appeared for the BBC Micro, until recently plotters for producing the output have been much too expensive, but with the introduction of the Hitachi plotters they are now a real possibility.

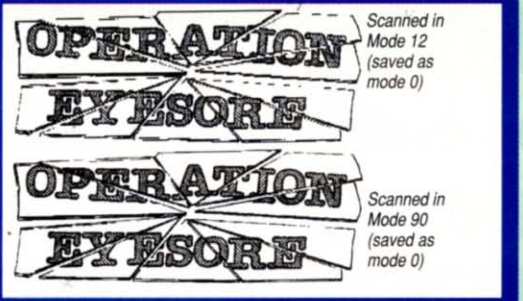
I'm not very familiar with HPGL – the language that drives the plotter – but have tried, in a limited way, to get it to work with some success but it took me ages.

The HPGL–compatible plotters are so superior to the normal printed graphics and line drawings, it would be a super addition to the BBC Micro. Is it possible? – **R. L. Bratby, Portsmouth.**

Toning up

ONE drawback of the Archi Hand Scanner from Watford Electronics is that it is only possible to save that part of the scanned image that is on screen. If you want to save the entire scanned image you must reduce the size until it fills the screen window. Unfortunately large line drawings suffer from the jaggies.

One way around this is to use the new screen modes supplied with !Impression.



Scanned in Mode 12 (saved as mode 0)

Scanned in Mode 90 (saved as mode 0)

Double-click !NewModes and then go to the Palette icon, press Menu and select screen mode 66 or, better still, 90. You will then be able to create images of a much higher resolution but still save them as Mode 0/18 or 12/20 sprites.

These sprites will take up a lot more space – up to four times as much – however if you want the improved quality it's worth it. – **Mark Wiggin, Newport, Shropshire.**

● Well, that's a pretty tall order – not only a driver for the plotter but a program too. Any offers?

More store to view

TO maximise the space on the ADFS disc – as I.S. Crawford wanted to do with ViewStore in the December 1989 issue – you can delete records from your database but these will still be held in the file.

To get rid of them you need to use the Select utility – selecting all the records. The undeleted records will be sorted into a select file in the S directory and the deleted records won't appear in this file.

However, the file is not in a format that can be read as a database. The Convert utility needs to be used, and this can take some time.

The new database file should have a different name to the original as it will be created in the D directory. All that remains is to delete the original database and rename the new with the old filename. The index files will have to be redone.

When finished, compacting the disc will free further space – although this will probably only yield fairly modest rewards. Copying the files as suggested to another disc won't help a great deal. Chapters three and five of the Viewstore manual give further

Throwing a curve

HERE'S a program which draws curves given three points. The routine is separated as a procedure so that you can extract it easily and put it into your own programs, although the many variables it uses haven't been LOCAL-ised. The three points are the start and end – x1,y1 and x3,y3 – and the control point which controls the degree of curvature. The example in the program draws a whole set of curves in a circular pattern with the control point always at the centre of the screen.

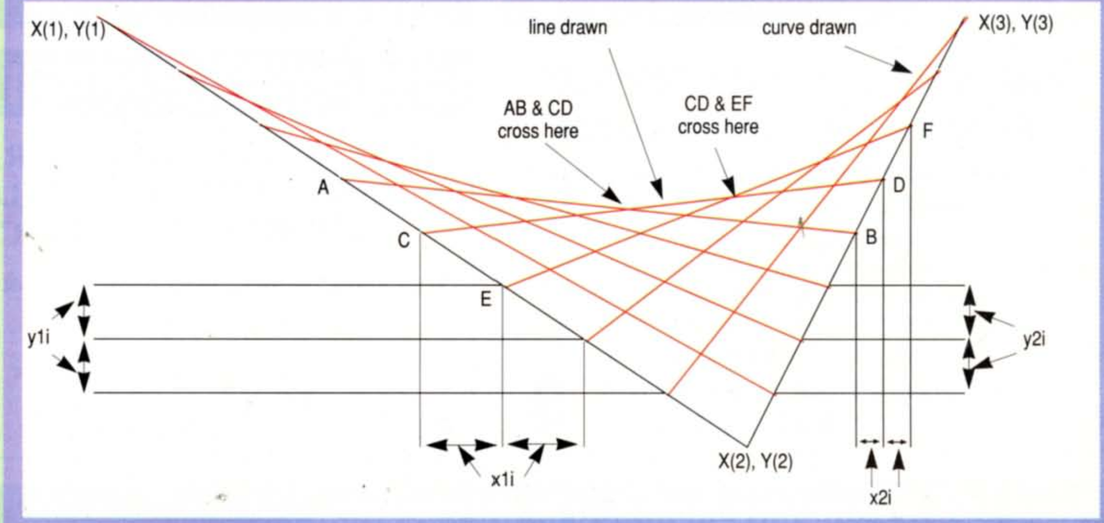
The program moves to the start of the curve and then calculates a series of points drawing between each as it goes. Each point is calculated from the crossing points of tangents to the curve. The diagram shows how it works.

Incidentally, can the Disc MOT program from the October 1988 issue be modified to handle ADFS discs? – **Mark Nellist, Wakfield, West Yorkshire.**

● Thanks for your excellent little program – arbitrary curve drawing is aways a problem on the 8 bit micros.

As for the MOT program – conversion would be quite a job, does any reader want to take up the challenge?

```
10 REM Curve drawing
20 MODE1
30 GCOL 0,1:fi=15*PI/180
40 x2=640:y2=512
```



information – in the 1986 edition pp32-38 give details about sorting. – **Paul Weddell, Redhill, Surrey.**

Accuracy and reality

I WAS recently writing a program with the following simple calculation which gave me a slight error. I had to take the integer part of this calculation:

```
PRINT 2.6 * 7 - 0.2
```

gives 18 which is correct. But:

```
PRINT INT(2.6 * 7 - 0.2)
```

gives 17, which is wrong, and this gives the same result:

```
N% = 2.6 * 7 - 0.2
PRINT N%
```

Does this have something to do with the way the computer stores and calculates real numbers? – **I. Molloy, Cheltenham.**

● It certainly does. The problem with so-called real numbers is that they can only be stored to a certain degree of accuracy. This means that as you use them they become more and more inaccurate.

This normally doesn't matter too much, but when you try converting back to integers the slight inaccuracies become apparent. One simple solution is to apply a correction:

```
PRINT INT( Z + .5 )
```

This has the effect of rounding up or down to the nearest integer rather than simply chopping off the decimal part, which is what the INT command does.

Keeping tabs on Dickie

I HAVE just typed in Dickie Brickie from the March edition of your magazine, and I am really enjoying it.

According to the table in the magazine, the Tab key is to be used to select a screen, but unfortunately this has been omitted from the program itself, so here are a few lines that should be added to Listing III to enable this function:

```
1255 IF INKEY-97 GOSUB 31
30:n%=0:ENDPROC
3130 PRINTTAB(6,4)"Level:
 ";:VDU8:VDU8
3135 *FX21,0
3140 W=GET:W=W-48:IFW
1 GOTO 3140
3150 PRINT;W;
3160 Q=GET:Q=Q-48:IF Q
9 GOTO 3160
3170 PRINT;Q;
3180 SN%=(W*10)+Q-1:IFSN%
=SN%-16
3190 RETURN
```

I hope this will enable more people to see the outstanding and imaginative graphics of this excellent game. Keep up the good work. – **Colin Macconnell, Kingswinford, West Midlands.**

Faster griddles

GRIDDLES, from the September issue, can be speeded up considerably by making use of the fact that the grid is perfectly symmetrical – only a quarter of the squares need to be calculated, the rest are simply reflections.

You need to make the following changes and additions:

```
  120 FOR X%=1 TO INT(S%/
2+0.5):FOR Y%=1 TO INT(S%
/2+0.5)
  141 FOR X%=1 TO INT(S%/
2+0.5):FOR Y%=INT(S%/2+0.
5) TO S%
  142 M%(X%,Y%)=M%(X%,S%-
Y%+1):NEXT:NEXT
  143 FOR X%=INT(S%/2+0.5
) TO S%:FOR Y%=1 TO S%
  144 M%(X%,Y%)=M%(S%-X%+
1,Y%):NEXT:NEXT
```

Although this isn't any good for non-symmetrical starting grids. In addition it's quite reasonable to use a fourth colour – black perhaps – as long as the relevant C%(3) is added. – **Jeremy Douglas, Ballyrobert, N. Ireland.**

The beat goes on

YOU can make your Beeb into a drum machine with this very simple listing:

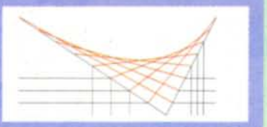
```
10 REM Drum Machine
20 REM by Daniel Saunders
30 ENVELOPE1,2,0,0,0,0,0,
0,-126,-2,0,-1,126,80
40 ENVELOPE2,0,0,0,0,0,0,
0,-126,-2,0,-1,126,80
50 ENVELOPE3,4,1,-1,1,1,1
,1,121,-10,-8,-12,120,120
60 *KEY0SOUND0,1,100,2|M
70 *KEY1SOUND0,2,150,2|M
80 *KEY8SOUND0,3,150,2|M
90 *KEY9SOUND0,3,100,1|M
```

After the program has been run pressing the function keys has the following effects:

```
f0 = Cymbal
f1 = Bass drum
f8 = Snare drum
f9 = Snare drum 2
```

– **Daniel Saunders (age 11), Woking, Surrey.**

```
 50 FOR LC=0 TO 2*PI-fi ST
EP fi
 60 x1=x2*COS(LC)+x2
 70 y1=y2*SIN(LC)+y2
 80 x3=x2*COS(LC+fi)+x2
 90 y3=y2*SIN(LC+fi)+y2
100 PROCcurve(x1,y1,x2,y2,
x3,y3)
110 NEXT:END
120 :
130 DEFPROCcurve(x1,y1,x2,
y2,x3,y3)
140 acc%=20
150 x1i=(x2-x1)/acc%
160 y1i=(y2-y1)/acc%
170 x2i=(x3-x2)/acc%
180 y2i=(y3-y2)/acc%
190 o1x=x1:o1y=y1
200 o2x=x2:o2y=y2
210 IF o2x=o1x o2x=o2x+.1
220 mn=(o2y-o1y)/(o2x-o1x)
230 cn=o1y-mn*o1x
240 MOVE x1,y1
250 x=x1:y=y1
260 FOR C%=1 TO acc%
270 n1x=o1x+x1i:n1y=o1y+y1i
280 n2x=o2x+x2i:n2y=o2y+y2i
290 IF NOT(n2x=n1x OR o2x=
o1x) PROCdraw1
300 o1x=n1x:o1y=n1y
310 o2x=n2x:o2y=n2y
320 NEXT:DRAW x3,y3
330 ENDPROC
340 :
350 DEFPROCdraw1
360 mo=mn:co=cn
370 mn=(n2y-n1y)/(n2x-n1x)
380 cn=n1y-mn*n1x
390 PROCsimeq(mo,co,mn,cn)
400 DRAW X,Y
410 ENDPROC
420 :
430 DEFPROCsimeq(A,B,C,D)
440 X=-(B-D)/(A-C)
450 Y=(B*C-D*A)/(C-A)
460 ENDPROC
```



```
 10 =    0 0    130 = CD1C 6    250 =  779 7    370 = EDEE B
 20 = EA3A A    140 = 34D6 B    260 = 583E 2    380 = 1E0C 3
 30 = 5F5F 7    150 = AD57 1    270 = A09D 2    390 = 9C32 1
 40 = E5C1 F    160 = 9AE9 7    280 = B158 9    400 = 1A6D 5
 50 = A5F1 7    170 = F9B5 C    290 = 1410 B    410 = ED0F B
 60 = DBA4 5    180 = CE0B D    300 = 6E8C 0    420 = 9719 A
 70 = AEC4 1    190 = 67DA F    310 = C953 2    430 = D8A3 B
 80 =  A63 F    200 = 7481 4    320 = DF43 E    440 = 2717 D
 90 = ABD1 5    210 = E8B6 C    330 = ED0F 2    450 = 1CE6 E
100 = 23B6 1    220 = 57D9 6    340 = 9719 8    460 = ED0F E
110 = F510 E    230 = 4679 0    350 = 95B8 7
120 = 9719 A    240 = 5D62 B    360 = AFAF 0
```

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

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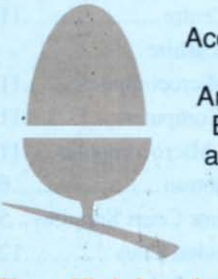

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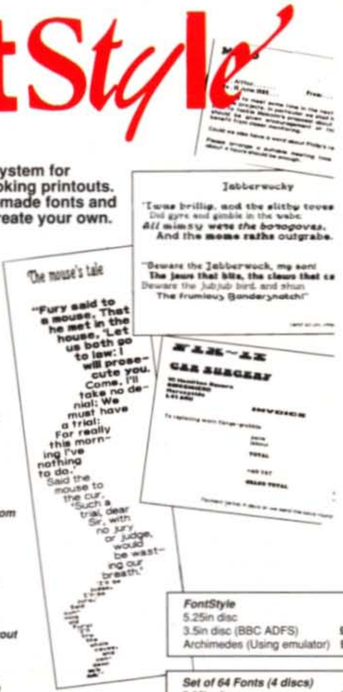

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Jabberwocky

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Did gyre and gimble in the wabe:
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Advertisers' Index

4 Mation 105
A1 Systems..................123
Abbco 98
Ace Computers............108
Advanced Computer Services 119
Advisory Unit................98
AJL Electronics 118
Apricote Studios............80
Atari UK 64-65
Automatic Services 122
Beebug 6, 8, 14-15
Boxoft..........................112
B&S Computing............53
Calderglen Computers...10
Cambridge International......70, 102
Cannon Computing.........98, 118
Cardigan Electronics ...119
C.J. Computers 123
CJE Micros....................21
Clares Micros 39, 101
Computaccount 72
Computeck 36
Computer Concepts 18, 60, 106-107
Computer Depot 122
Computer Eyes 118
Computer Shopper Show 78
Computer Tutorial 122
Computerware Research .123
Computer Workshop....118
Contex Computing 80
Craddock Computers...122
CSS Computer Centre .130
DA Computers.............119
Dabhand Computers 26-27
Datastore 102
DGA Software.............105
Diamond Computers 35
Digiserve 123
Electronic Font 102
EMR 112
Fact Systems................130
Field Electronic 108
G.A. Computers 123
Home Based Business .112
Ian Copestake 80
Impact 16-17
Integrex 2
J. R. Lectronics............118
Kendal Computer Centre......................118
Lancashire Microcomputers 119
Le Computer................119
Lee Microcomputer 119
Logotron 69
Manor Court Supplies ...58
Mauden Sales 122
Micro Aid 112
Micros Boss.................108
Microfix..........................98
Micro Media..................82
Morley Electronics 13, 28-29
Minerva 63
Norwich Computers Services 48
Orion Computer Services 54
Pineapple Software........43
Resource Facilities 123
Serious Statistical Software 112
Sigma Press 130
Silica Shop 75, 131
Simtron 102
Software Bargains 40
Special Reserve 32
Superior Software........132
TMJ Computer Software 130
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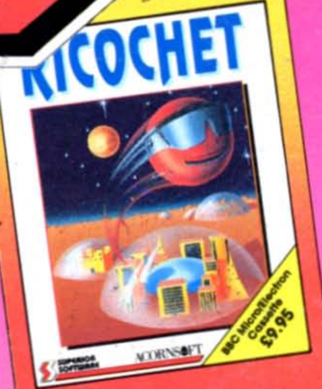
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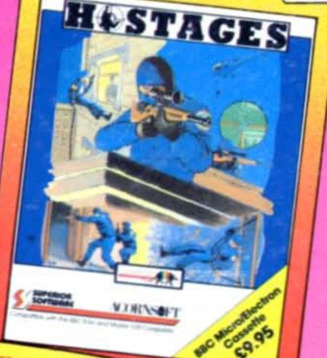
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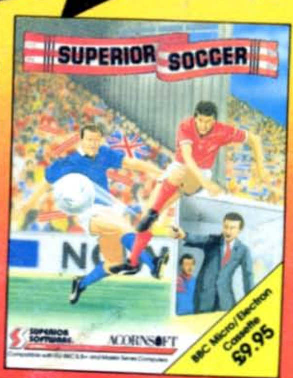
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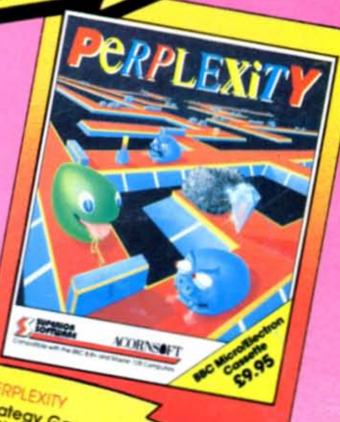
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